

1.0 Introduction

This environmental issues (EI) chapter has been prepared as part of the Washington State Energy Facility Site Evaluation Council's Potential Site Study for the BP Cherry Point Cogeneration Project.¹

The EI chapter is intended to meet several objectives. First, it should provide the proponent, BP, and its consultants with an overview by discipline area of how EFSEC and its independent consultant understand the project as presented by BP. Secondly, the EI chapter should reflect comments and issues raised by agencies, Indian tribes, non-governmental organizations, and members of the public during the coordination and comment phase of the PSS.

As a part of the PSS process, the EI chapter is not intended to be a thorough study of the project and its potential impacts. This would be premature; the project details will likely continue to evolve from the concept initially presented at the agency and public meetings in May 2001 to that eventually included in the ASC. The proponent will provide a detailed project description and environmental analysis in the ASC. EFSEC will review the ASC and provide additional detailed analysis in the ensuing EIS. The EI chapter is intended for use by EFSEC in considering issues related to the proposed project. It will also be used by other agencies and governmental organizations, Indian tribes, the public, and non-governmental organizations to learn about and develop an understanding of the proposed project and to determine whether or not it may affect issues of concern to them. EFSEC will make the Potential Site Study, including this EI chapter, available to those individuals and groups and will continue to solicit comments regarding the proposed project throughout the preliminary assessments and during the application review process (described in the introduction to this PSS document).

The EI chapter: (1) describes the proposed project as currently envisioned by the proponent, (2) describes the relevant existing environmental conditions and potential for impacts that could result from the project by discipline area, and (3) identifies specific issues, methods, or study approaches that the proponent should use to complete the ASC.

The EI chapter was developed based on:

- Preliminary and updated information provided by BP;
- The results of reconnaissance-level field surveys conducted by Shapiro and Associates, Inc. in April, May, and June 2001;
- Reviews of relevant published information and preliminary project comments obtained at the agency meeting, open house, and public meeting conducted by EFSEC on May 2, 2001;
- Comments obtained at several state and local agency meetings conducted by EFSEC;
- Direct discussions and correspondence with Canadian agency personnel;
- Direct discussions and correspondence with tribal organizations; and
- Direct discussions and correspondence with state and local agency personnel.

The EI chapter consists of the following sections:

- Introduction

¹ EFSEC formerly used the term "environmental assessment" for this chapter in the PSS document. This term is misleading because it also is used to describe a specific type of environmental document required for some projects in response to the federal NEPA environmental review process. However, this EI is part of a preliminary evaluation of a proposed energy project conducted by EFSEC, and it is different from a federal environmental assessment.

Chapter II: Environmental Issues

- Description of the Proposed Project
- Existing Conditions and Issues

2.0 Description of the Proposed Project

2.1 Introduction

BP Corporation proposes to build a new power plant adjacent to its Cherry Point petroleum refinery located near Blaine, Washington. This section of the EI chapter describes the proposed project based on information provided primarily by BP.

BP is proposing to build a natural gas-fired, combined-cycle cogeneration facility on approximately 25 acres of land next to the BP refinery. The proposed generating capacity (gross) is 720 mW. As currently proposed, the BP Cherry Point Cogeneration Project would serve two purposes: (1) to generate steam and electrical power for the refinery, and (2) to provide base-load electrical generating capacity for the Northwest power grid. BP has stated its intent to set aside a portion of the generated power to be sold at “advantaged” rates (rates somewhat lower than market or otherwise preferable) to customers in Whatcom County and Washington.

The entire project, including the new transmission lines, would be on refinery-owned property and contained in a Major Industrial Urban Growth Area/Port Industrial zone as defined in the Whatcom County Comprehensive Plan, issued May 20, 1997. The entire project area is zoned Heavy Impact Industrial. The plant would be configured with three gas-fired combustion turbines, each driving an electric generator. Each of the gas turbine “trains” would be equipped with a heat recovery steam generator (HRSG) and would have duct-firing capability to augment steam production. Steam would be produced at high pressure in the heat recovery steam generators and sent to one steam turbine-driven electric generator with extraction and condensing capability. In addition to providing refinery fuel gas (for duct burning in the HRSGs) and emergency fuels, the refinery would also serve as a “steam host” for a portion of the steam produced by the combustion turbines.

The primary fuel, natural gas, would be supplied through two pipelines: (1) an existing company-owned, proprietary natural gas pipeline running directly from Canada to the refinery (which would provide most of the gas needed); and (2) one of two alternate pipelines each operated by a third party (which would provide the remaining gas needed). The two candidate pipelines being considered are: (1) an existing Cascade Natural Gas pipeline adjacent to the BP-owned pipeline that was previously used for supplying natural gas to the refinery; or (2) the Georgia Strait Crossing (GSX) Pipeline across the Strait of Georgia proposed by the Williams Company and BC Hydro.

The electrical interconnection for the new transmission lines would occur approximately one mile east of the refinery on an existing 230-kilovolt (kV) BPA radial line that runs from the Custer Substation to Alcoa Intalco Works. Therefore, the two new transmission lines needed for the project will each be approximately 1 mile long and would be routed on BP property through a corridor that is already permitted for a transmission line. Each line will have three separate conductors or “wires,” one for each phase, mounted on a line of towers. The two sets of three conductors that constitute the two new transmission lines could be suspended from a single line of towers or on two parallel lines of towers. If two lines of towers are used, these lines may need to be separated from each other somewhat, necessitating a wider corridor.

The project will use air cooling only to condense the low pressure steam leaving the steam turbine. With air cooling technology, the low pressure steam is routed through large banks of finned condenser tubes. These tubes remove heat from the steam and condense it back to water for making more steam in the HRSG. Cooler outside air is forced to move across the fins (no water is evaporated as is used in conventional cooling towers). Large fans are required to move the air over the finned tubes, so this technology uses somewhat more electrical power than water cooling technology.

2.2 Proposed Project

Section 2.2 provides information on the following aspects of the BP Cherry Point Cogeneration Project:

- Proposed Plant Location and Vicinity
- Project Facilities
- Construction Activities
- Operation
- Schedule and Workforce
- Costs

2.2.1 Proposed Plant Location and Vicinity

The BP Cherry Point Refinery and BP property boundaries are illustrated in Figure 1. The BP refinery and surrounding properties owned by BP are mainly zoned Heavy Impact Industrial and Light Industrial and are contained in the Cherry Point Major Industrial Urban Growth Area/Port Industrial Zone, as defined in the Whatcom County Comprehensive Plan (2001). The Cherry Point Major Industrial Urban Growth Area/Port Industrial Zone is approximately 6,500 acres, of which approximately 2,500 acres are currently occupied by heavy impact industries. Figures 2 and 3 are land use maps of the Cherry Point subarea from the Comprehensive Plan and of western Whatcom County, respectively. The proposed 25-acre site for the BP Cherry Point Cogeneration Project is shown in Figure 4. The site has a 337-foot buffer between the centerline of Grandview Road and the north facility boundary (237 feet from the BP natural gas pipeline right-of-way). The proposed cogeneration facility site, which is surrounded by a minimum of 0.5 mile of industrial land use zones, would be entirely within BP property and would be 0.75 mile from the nearest BP property boundary.

2.2.2 Project Facilities

The proposed cogeneration plant consists of several primary components. The largest component is the generation plant itself. The project also includes utility infrastructure to support the cogeneration plant, such as fuel systems that would include natural gas, refinery gas, and emergency fuels (to be used on a limited basis in the event that natural gas is not available). In addition, electrical transmission facilities must be built to connect the cogeneration plant with the refinery and the BPA transmission grid. Air-cooling would be used for condensing spent steam. The following paragraphs describe these facilities in more detail.

Figure 1

Figure 2

Figure 3

Figure 4

2.2.2.1 Cogeneration Plant Site

Plant Components

Plant components are arranged in a combined-cycle layout and include combustion gas turbines (CGTs), HRSGs, a steam turbine generator (STG), and associated support equipment. The plant would generate approximately 720 mW of electrical power (gross). The refinery consumes about 85 to 90 mW and that could increase slightly with projects being considered to produce cleaner (lower sulfur) fuels. Therefore, net power generation for commercial sales could total a maximum of about 635 mW.

The project would include three CGTs (the precise manufacturer and model have not yet been selected), three HRSGs equipped with supplemental duct firing (the precise manufacturer and model have not yet been selected), and one STG. Other key plant facilities include: air-cooled condensers, natural gas compression (inside the refinery), maintenance warehouse, utility and instrument air compressors, a 230-kV substation, a 69-kV substation, control and administration facilities, a dedicated high purity water treatment facility, parking and transfer areas, water storage facilities, chemical storage facilities, and two gas-metering stations.

A portion of the produced steam would be diverted to the refinery to serve an existing steam demand, and as a result the refinery would be able to shut down three older utility steam boilers. The cogeneration feature of this project makes it more thermally efficient and would provide offsetting emission reductions. The projected heat rates for the project are about 6,500 British thermal units per kilowatt-hour (Btu/kWhr) (higher heating value) and 5,850 Btu/kWhr (lower heating value), based on providing 690,000 – 820,000 pounds per hour of steam to the refinery. Comparable heat rates for stand-alone power plants are typically quoted at above 7,200 Btu/kWhr. BP is also evaluating other thermal integration projects for the refinery at this time.

BP is acutely concerned with the reliability of steam and availability of reasonably priced electricity for refinery operations. BP has selected the three-train configuration with only one steam turbine generator to provide sufficient redundancy so that adequate steam can be produced to operate the refinery. If one of the CGT/HRSG trains is down for scheduled maintenance, two other trains would still be operating. If one of those trains should unexpectedly shut down for any reason, the refinery could continue to operate on only one train. Although one HRSG is capable of providing all the steam needed for refinery operations, BP has concluded that it cannot shut down existing boilers without a high level of assurance that at least one HRSG will be operating at all times.

Buildings and Structures

The largest onsite structure would be the air-cooled condenser, and the HRSGs. Buildings would include: the administration building, the control building, maintenance shop, the warehouse, and the STG building. As currently proposed, all three CGTs would be parallel to one another with each train lined up in an east-west orientation. The three stacks would be aligned in a north-south orientation. Exhaust generated by each CGT would be routed to its own adjacent HRSG. Each HRSG structure would be approximately 60 feet tall. Exhaust from each HRSG would be routed to its own adjacent stack, which would be approximately 165 feet tall. Steam generated by each HRSG would be directed to the refinery through two insulated pipelines (high and intermediate pressure steam) that would run to the west to tie

into the existing steam systems near the center of the refinery. Excess steam not used by the refinery would be directed to the STG area.

As described in Section 2.2.4 (Operation), each HRSG would be equipped with a selective catalytic reduction system that would use ammonia injection to minimize the production of NO_x. The anhydrous ammonia storage and transfer system would consist of equipment intended to vaporize the anhydrous ammonia. This equipment would be located next to each SCR system, and there would be a common ammonia storage vessel, ammonia transfer pumps, vaporizer, associated piping, and controls. An unloading station for trucks would be located at the common ammonia storage tank. The system would be designed to return displaced ammonia vapor to the unloading vehicle. The ammonia storage tank would be sized to store a multi-day supply of anhydrous ammonia. A spill containment facility would be provided around both the truck unloading station and the ammonia liquid storage tank.

The project includes the following buildings: administration building, control room, maintenance shop, warehouse, and steam turbine building. Other large structures include three HRSGs, three stacks, and the air-cooled condenser. Buildings on the site would likely consist of a steel framework covered with painted metal panels. Building(s), the condenser, exhaust stacks, and other large outdoor equipment would likely be painted neutral colors to minimize visual impact. Design and construction of the buildings and other structures would be completed in accordance with appropriate county and commercial building codes and standards.

In addition, the following facilities and equipment would be constructed onsite:

- A dedicated demineralized water system for the steam cycle. This system would provide high purity makeup water to replace what is lost to blowdown and consumption by certain refinery processes. The area would also include permanent pumps and equipment necessary to transfer the generated water to storage and to the plant.
- Two gas-metering stations to connect to and meter the natural gas fuel supply.
- One refinery fuel gas meter to document quantities used in the duct burner systems.
- Custody transfer meters will be installed on all process streams that flow between the refinery and the cogeneration plant.

Site Access

The cogeneration site is entirely located within BP-owned property. The cogeneration plant main access would be the north plant access road off of Grandview Road. Limited access will also be provided off of Brown Road to the south and off of Blaine Road inside the refinery to the west.

Site Security

The power plant would be located within the general refinery-owned property, which is entirely enclosed by a chain-link security fence approximately 6 feet high and topped with three strands of barbed wire. BP maintains its own security patrols at the refinery 24 hours per day, 365 days per year. The electrical substation would have its own perimeter fence and gates to prevent unauthorized access to the high-voltage equipment in the substation. The gas-metering stations would be similarly equipped.

Exterior lighting would be provided throughout the site as required for security and safety. Illumination levels would be established in accordance with appropriate code requirements.

2.2.2.2 Fuel Systems

Natural Gas Pipelines

The primary fuel for the cogeneration plant would be purchased natural gas. Two carriers of this fuel are now proposed. Most of the natural gas would be obtained from the company-owned proprietary pipeline. The refinery owns 90 percent of the natural gas pipeline, and Alcoa Intalco Works owns the remaining 10 percent. The pipeline obtains gas from Westcoast Energy at a terminus on the Canadian side of the border at Sumas. The existing 16-inch-diameter natural gas mainline is located next to the western and northern edges of the proposed project site. The existing metering station, which is currently the preferred tie-in location, is west of the project site along the contractor's entrance road. A short section of new pipeline (referred to as the "pipeline connection") would need to be constructed from the metering station to the fueling area at the CGT/HRSR trains. The BP pipeline would be operated at existing allowable pressure limits. No compressor stations are proposed to increase the operating pressure within this pipeline.

The existing BP gas pipeline would need compression at the delivery point at the refinery. Two natural gas compressors (a main and a spare) would be added near the metering station to supply the cogeneration plant natural gas at the required pressure. A new pipeline connection and metering station would be needed near the existing metering station west of the project site. This location is also the preferred tie-in location for the BP-owned pipeline. A short section of new pipeline (referred to as the "pipeline connection" would also need to be constructed from the compressor to the fueling area at the CGT/HRSR trains.

In addition, the remainder of the natural gas needed to fuel the cogeneration plant would be obtained through a second pipeline, one of two possible pipelines being considered. The first candidate is an existing Cascade Natural Gas Company pipeline located next to the BP-owned pipeline. This line was previously used to supply the refinery with natural gas before the company-owned line was constructed. It is currently used to supply natural gas to the Puget Sound Energy Whitehorn Power Station west of the BP refinery. A third-party supplier would provide gas delivered from this pipeline.

The second candidate pipeline is one proposed to cross the Strait of Georgia, and its expected alignment would be very close to the plant, potentially on BP property. The pipeline, proposed by Williams Company and BC Hydro, could be available by the time permitting and construction has been completed for the cogeneration plant.

Refinery Fuel Gas

The Cogeneration plant would be designed to burn refinery fuel gas in the duct burners. A byproduct of refining process, refinery fuel gas is a high quality fuel that is composed primarily of methane and small quantities of light hydrocarbons including ethane, propane, and butane. All boilers and heaters throughout the refinery burn a mixture of this produced refinery fuel gas and natural gas. Produced fuel is normally routed to a central location where it is mixed with natural gas and then routed back into refinery to the process heaters and boilers. The refinery normally utilizes all the produced fuel and makes up additional fuel needs by importing a small amount of natural gas. After the cogeneration plant is constructed and operating, the refinery would normally continue to import a small amount of natural gas. However, every two to three years the refinery shuts down process units, such as the hydrocracker, for three to four weeks to perform maintenance and at these times the refinery produces more fuel than it can consume. Without the cogeneration plant, excess gas

would be routed to the flare. With the cogeneration plant, the excess gas would be routed to the duct burners, where combustion products would be treated in the SCR and CO catalyst systems to minimize pollutant emissions.

BP is proposing to consume the excess refinery fuel gas, as available, in supplementary duct burners located between the CGT and the HRSG unit of each train. The refinery fuel gas cannot be burned directly in the CGT units because the refinery fuel gas heating value is too variable and would invalidate manufacturer's warranties on any gas turbine. By burning the refinery fuel gas in the ducts before the HRSG, the heat value can be recovered as steam within the HRSG and the resulting combustion byproducts (off-gases) would be treated in the SCR and carbon monoxide emission control systems.

Emergency Fuel

BP is considering options for the use of an emergency fuel in case the natural gas supply from the pipelines is ever temporarily disrupted. Since the cogeneration plant is associated with a petroleum refinery, the likely emergency fuels are distillate fuels available from tanks or units within the refinery. BP has indicated that it would use low-sulfur content fuels in any event. Since the refinery is a major distillate producer in the region, this fuel is a likely candidate, but other intermediate hydrocarbon streams are available within the refinery. BP has publicly proposed that it would use only low-sulfur emergency fuels and would limit operations on these fuels to a total of 10 days over a 10-year period. In addition, the cogeneration plant would operate only two of the three CGT/HRSG trains during emergency fuel burning to provide reliable steam and electricity to the refinery. (Two units are needed to provide a backup for reliability.) Emergency fuels would only be used for fueling the cogeneration plant during natural gas supply interruptions, which would be beyond BP's control. BP would not use any emergency fuel for normal operation.

2.2.2.3 Electrical Transmission Connections

Electrical power generated by the project would be routed to a substation east of the CGT/HRSG trains, then south to two new 230-kV transmission lines that would probably be owned by BPA on BP's property, then interconnect with the existing 230-kV BPA transmission system to the east. Power (in excess of the 85 to 90 mW used by the refinery itself) would be routed to an interconnection point approximately 1 mile east of the project. The proposed transmission line corridor is an existing corridor, having been permitted through as part of an earlier project intended to connect the refinery to the BPA 230-kV system. The interconnections would be made to the western of the two 230-kV BPA radial lines running in a north-south direction east of the BP Cherry Point Refinery property between the Custer Substation and the Alcoa Intalco Substation.

In February 2001, BP submitted an interconnect request to BPA to allow the project to connect to BPA's 230-kV transmission line. BPA has not completed a System Impact Study, which would determine how the transmission lines would connect to the BPA system, but is expected to do so by December 2001.

A substation would be built to supply the refinery's existing 12-kV power system with power stepped down from the main substation. A power line would also be constructed to route electric power underground to the refinery. No detail is yet available on voltage, interconnection points, routes, etc.

2.2.2.4 *Water Supply and Discharge*

Water would be used for several purposes in the proposed cogeneration project. High purity water would be needed in the HRSG and steam turbine circuits to make steam and replace the blowdown water removed from the system to control impurities. In addition, potable water would be used for restroom facilities in the cogeneration plant and for washwater in the plant.

Whatcom County PUD No. 1 currently services the BP refinery through an existing water supply pipeline, which discharges to a freshwater reservoir several hundred feet to the southwest of the refinery and cogeneration project area. Makeup water for the project in the amount of approximately 500,000 gallons per day would meet additional water supplies needed by BP, but could be provided pursuant to BP's existing contract and water rights through the PUD. This water would only be used to make up for blowdown from the steam circuit and steam losses in the refinery.

BP proposes air-cooled condensers for the project, which do not use any water for steam condensing. Therefore, no pipelines are proposed to supply cooling water.

A pipeline would be needed to connect the cogeneration plant to the refinery's potable water system. The potable water would be routed to the cogeneration plant from the refinery boiler house by an overhead pipe along with other interconnecting pipes between the refinery and the cogeneration plant.

Wastewater would be generated from three principal sources: blowdown from the steam circuit, wastewater from the water purification plant, and restroom facilities at the plant. Wastewater generated from blowdown and the water purification plant would be discharged into the existing refinery wastewater treatment system, where the combined streams would be discharged at an existing NPDES point on the refinery dock in Puget Sound. The discharge point is located at the end of the dock at a depth of approximately 65 feet and includes a dilution manifold. Sanitary wastewater from the restroom facilities would be discharged into the refinery's sanitary wastewater system, which would discharge to the Birch Bay Waste Water Treatment Plant.

2.2.3 *Construction*

2.2.3.1 *Cogeneration Plant Site*

The proposed 25-acre site of the generation plant and the substation (the project footprint) would be graded level using onsite materials to the extent possible, although imported fill may be required as well.

The sequence of the primary construction activities is expected to be as follows:

- excavation and cobble removal, with unsuitable material and cobbles used onsite as nonstructural fill;
- stormwater drainage system excavation and surrounding embankments installation;
- structural fill installation, rough preliminary site grading, and stormwater drainage system construction of underground components;
- roadway base construction;
- major foundation construction for equipment and buildings;
- underground utilities construction;
- equipment installation and building construction;

- finished road surface construction; and
- final site grading.

During construction, the cogeneration plant's access roads would be surfaced with aggregate. The substation, gas-conditioning station, and some equipment and access areas would also be surfaced with aggregate after major construction activities are completed.

The construction staging and fabrication areas are expected to be located either: (1) to the west of the cogeneration plant site in areas that are currently used for laydown and fabrication for refinery projects, or (2) adjacent to the project site on the east in upland areas currently planted with hybrid poplars. Materials and equipment would normally be transported to the site by trucks using existing roadways. Heavy, oversized loads, such as the combustion turbines, would be transported to the site by rail or barge. A rail line is located to the east of the refinery and could be used for delivery of equipment that is too heavy for highway transport.

2.2.3.2 *Fuel Systems and Electrical Transmission Connections*

Short sections of pipeline would be constructed from the new metering station to the fueling areas at the cogeneration plant. In addition, pipelines for the refinery fuel gas and emergency fuel would be constructed between the refinery and the fueling areas at the cogeneration plant. Refinery fuel gas and emergency fuel would be routed between the refinery and the cogeneration plant on an overhead pipe rack along with steam pipes and other interconnecting process pipes. Within the refinery, the specific routes, points of interconnection, and construction methods for these pipelines are unknown at this time.

Similarly, no construction details are currently available for the interconnection of the new 230-kV electrical transmission lines to the existing 230-kV BPA transmission line that runs from the Custer Substation to the Intalco Substation (west line). When completed, the BPA System Impact Study should provide information about this interconnection. The underground power line to the refinery would follow a route similar to the overhead pipe rack.

2.2.3.3 *Stormwater Collection and Treatment*

Stormwater runoff would be controlled during construction to minimize soil erosion and the potential associated impacts. Silt fences and temporary swales would direct the majority of the runoff to a retention basin for treatment by settling prior to discharge. Perimeter silt fences around the construction zone would be installed to remove sediment from runoff before it reaches the site boundary. Additional localized silt fences would be used, as required, during construction to minimize erosion and the transport of soil. Temporary swales would be moved to accommodate areas being excavated or filled. Once the preliminary cut-and-fill work is complete, the swales would likely remain in place until final grading. Wherever possible, temporary swales would be incorporated into the permanent stormwater collection system. The perimeter silt fence would not be removed until the site is stabilized.

As elements of the permanent stormwater collection system are installed, they would be used to collect construction runoff. Silt fencing, intended to prevent sediments from entering, would protect inlets to the permanent system. Seeding and mulching would be used, where practical, for slope stabilization as rough grading is completed.

2.2.4 Operation

2.2.4.1 Cogeneration Plant Site

The proposed cogeneration plant is designed to recover waste heat from the exhaust of the CGT and to use that heat to produce additional power and steam for the refinery. Air drawn through the inlet of the CGT would be filtered, compressed by the rotating blades, and delivered to the combustor at substantially increased pressure and temperature. In the combustor, natural gas fuel would be mixed with the compressed inlet air and burned. The high-temperature, high-pressure exhaust gas mixture would then expand and move across the turbine rotor blades, which are connected to the CGT rotor, causing the rotor to spin. The CGT rotor shaft would drive a generator that would produce the electrical power (see Figure 5). Figure 6 shows the anticipated utility interconnections between the cogeneration plant and the refinery.

Exhaust would exit the CGT and flow directly to the HRSG, where heat from the exhaust would be used to generate steam. In addition, supplemental firing in each HRSG (through duct burners) would be provided using natural gas or excess refinery fuel gas, when available.

Each HRSG would be equipped with a selective catalytic reduction system to remove NO_x , which is a byproduct of the combustion process. The SCR system would inject a mist of diluted ammonia into the exhaust stream before it passes through a catalyst. The ammonia would react with NO_x in the presence of the catalyst to produce predominantly nitrogen and water. Each HRSG would also include a catalyst reactor section to control carbon monoxide emissions generated by the CGT.

Each of the HRSGs in the power block would supply high-pressure steam to the STG. The steam in turn would rotate the turbine shaft, which itself would drive a generator producing electrical power.

To achieve cogeneration operation with the refinery, steam at two different working pressures, intermediate and high pressure, would be directed into the refinery through separate insulated pipelines. Only the intermediate pressure steam would be extracted from the STG. The steam would enter the plant near the existing steam boiler locations. Three of the four existing steam boilers would be permanently shut down once the cogeneration plant is operational. Condensed water would be returned through a pipeline to the cogeneration plant to be recycled into more steam. Some steam is consumed by the refinery and would not return to the cogeneration plant.

Exhaust low-pressure (low quality) steam from the steam turbine and return pipeline would be transported through a large exhaust duct and into the air-cooled condenser. Each condenser would have a series of finned-tube modules. Fans located below the modules would produce upward airflow through the modules and across the exterior of the finned surfaces for heat removal. Heat removed from the process within the condenser would pass into the atmosphere. The condensed steam, or condensate, formed within the condenser would drain by gravity to a collection tank. Pumps would transfer the condensate from the collection tank back to the three HRSGs, where it would be reused to generate steam.

Figure 5

Figure 6

As the water in this type of closed system circulates, impurities concentrate in the system. To prevent the precipitation of solids and formation of scale, some water (quantity unknown until the engineering design has been finalized) would be periodically removed from the cycle (“blowdown”) and routed to the refinery wastewater treatment system. Demineralized (high purity) water would be added after blowdown to maintain the appropriate amount of water in the steam-production cycle.

Because reducing the concentration of dissolved solids is important to the efficient operation of the process, the water in the closed system would be routed through a condensate “polisher” to remove solids (calcium, magnesium, silica, and other ionic constituents). This treatment reduces the potential for scaling as the steam is recycled and concentrated. In addition, a flash tank would be included to capture, clean, and reuse a large amount of the blowdown.

2.2.4.2 Emission Controls

This section describes the four types of emission control systems proposed as part of the BP Cherry Point Cogeneration Project.

Dry Low-NO_x Combustion

Dry low-NO_x combustors would be included in the CGTs to limit the production of NO_x during combustion. These combustors are designed to maintain a fuel-to-air ratio such that the quantity of oxygen in the air introduced into the combustion process is just sufficient to allow the fuel to burn. This “lean” ratio results in a relatively cool combustion zone. NO_x is produced at high temperatures; therefore, lowering the temperature in the combustion zone would minimize NO_x production.

Selective Catalytic Reduction

Each HRSG would be furnished with a complete SCR system to control concentrations of NO_x generated by the CGT and duct firing. Anhydrous ammonia (NH₃) supplied from a storage tank on the plant site is anticipated to be used in the SCR system for NO_x control. In the presence of a catalyst, ammonia will react with NO_x to form water vapor and nitrogen gas.

The SCR system would be located in a temperature zone of the HRSG intended to optimize the performance of the catalyst at all normal operating loads and ambient temperatures. The rate of ammonia injection would be governed by the inlet NO_x concentration, as measured by a continuous emissions monitoring system. Injections of ammonia would be adjusted to the lowest possible rate to maintain the required outlet NO_x concentration, expected to be 2.5 ppm. The ammonia slip, or level of unreacted ammonia (expected to be 5 ppm), from the SCR would be minimized through good operating practices and proper instrumentation.

Carbon Monoxide Catalyst

Each HRSG would be furnished with an integral carbon monoxide (CO) catalyst reactor intended to control concentrations of CO generated by the CGT. The CO catalyst reactor would be located in a temperature zone of the HRSG where the catalyst would be most effective at all normal operating loads and ambient temperatures. CO concentrations in the

exhaust gas stream are expected to be 2 ppm. Toxic CO is converted to non-toxic carbon dioxide (CO₂) by reaction with excess oxygen in the exhaust gases.

Greenhouse Gas Controls

BP has made a commitment to comply with the principles of the Kyoto Accord for greenhouse gas control. BP has stated that greenhouse gas emissions from the proposed project would be fully mitigated through reductions in greenhouse gases from its worldwide operations. Through this system, greenhouse gases are offset on a worldwide basis. Although the project would principally emit the greenhouse gas, carbon dioxide, BP may select other greenhouse gases, such as methane, to use for calculating offsets. The global warming potential of methane is 22 times greater than for carbon dioxide.

2.2.4.3 Fire Protection

Sprinkler systems would be provided in the areas below the turbine-operating floor. Deluge fire protection systems would be provided for the step-up electrical transformers. Both the sprinkler and deluge systems would operate automatically. In addition, hose stations would be provided in accordance with appropriate code requirements and standard practice recommendations throughout any enclosed buildings. An underground water supply loop for fire suppression would encircle the main site inside the perimeter road with branch lines as required. Hydrants would be provided along this loop for fire protection outside any buildings. Hydrants and hose stations would be manually operated. Water for these systems would be supplied from the refinery's water supply.

Total flooding gaseous systems should be used within the enclosures surrounding the CGTs. These automatic systems, which usually are equipped for backup manual initiation, would comply with CGT manufacturer's standards for "clean-agent" fire extinguishing systems to avoid ozone depletion.

Portable dry chemical fire extinguishers would be located throughout the facility in accordance with appropriate code requirements and recommended practices. Each extinguisher would be selected as appropriate for the type of fire expected and the equipment or area to be protected.

An integrated fire detection system would be provided in the main structures of the facility. This system would use appropriate heat or smoke detectors for the equipment or area being protected and would trip alarms automatically. The fire detection system would be interconnected throughout the plant to provide local alarms and alarms in the central control room.

In addition to the active fire protection systems described above, passive fire protection (such as fire-rated walls, doors, and protected egress routes) would be included in the structural and architectural design of the facility in accordance with National Fire Protection Act 101 and 850 and state and local codes.

BP maintains its own fire response team for the refinery, which coordinates with the local fire jurisdiction having authority, Whatcom County Fire District No. 7. Together, these organizations operate under a unified command structure to respond to all fire and emergency responses. Minor fire or emergency medical needs are typically handled by the BP response team alone. This system would be extended to cover potential fires and emergency medical needs at the cogeneration plant.

2.2.4.4 Stormwater Control

Although the project design is not complete, it is expected that the main area of the plant would be divided into drainage areas for purposes of runoff design. One area could contain the site's substation. Another area could contain the remainder of the developed site, including the power generation area.

In the substation area, the ground would be surfaced with a crushed rock base to prevent ponding and to reduce grounding potential. Grading would result in a level terrain, facilitating percolation and retarding runoff. Equipment in the substation should be gas-insulated, not oil-insulated, and should contain no spillable oil. Equipment in the substation would be supported on small concrete foundations surrounded by the crushed rock surface. There would be no sizable impervious surfaces and no candidate surfaces for potential oil contamination. No retention basin is anticipated for this area. Drainage in the substation area would likely run to the northwest following the general existing grade of the site.

Impervious surfaces in the other main drainage area would include the administration building, the air-cooled condensers, and paved parking areas and access roads. A stormwater retention basin included in the design would collect site runoff from these areas for later treatment and discharge. The design rationale for the stormwater collection system is to control offsite runoff and allow water to percolate to the existing aquifer in such a way as to duplicate the flows of the undisturbed site.

Stormwater falling on the facility's major structures would be collected in gutters at the roof edges and routed to drainpipes. These pipes would discharge into common underground storm sewers, which would convey the runoff to the stormwater system, which would include an oil-water separator. Runoff from paved roads and other outdoor areas that might potentially contain oil or other chemical contaminants would also be routed through the stormwater treatment system before being discharged. Similar routing would be used for runoff collected from containment areas around transformers and spill collection areas at the ammonia storage tank.

Stormwater from the cogeneration site collection and retention system would be discharged in one of two ways currently being evaluated by BP. In Option No. 1, treated stormwater would be directed to the wetland mitigation area proposed north of Grandview Road for use in enhancing wetlands. In Option No. 2, the discharge would be piped into the existing refinery stormwater system. Stormwater must be adequately treated as per the most recent Ecology Stormwater Manual (2001) before being discharged into any wetland or stream system.

2.2.4.5 Contamination Control

All areas that house chemicals would be protected with concrete containment. All indoor areas with the potential for oil or lubrication spills would also be protected by concrete containment structures. Drains in these locations would be directed to an oil-water separator. Treated water from this oil-water separator would be discharged as wastewater to the existing refinery wastewater system and would not be directed to the stormwater collection system.

2.2.5 *Schedule and Workforce*

2.2.5.1 *Construction*

Construction of the plant would take place over a two-year period. The peak labor force during plant construction is estimated to be 400 individuals, and this peak would last for about six months.

2.2.5.2 *Operation*

The plant would operate 24 hours a day, 7 days a week. It is estimated that a total of 35 individuals would be employed at the plant, which would operate in two shifts.

2.2.6 *Costs*

The total capital cost of the project would be approximately \$450 million (all costs are presented as 2001 dollars).

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3.0 Existing Conditions and Issues

3.1 Earth

This section describes existing geologic and soil conditions at the proposed 25-acre BP cogeneration facility site, which includes the power plant and electrical transmission lines from the proposed facility to the existing BPA lines. Earth issues typically include slope stability, seismicity, erosion potential (also related to water quality and fish habitat), the magnitude of filling and grading operations, and special foundation conditions (e.g., compressible soils).

3.1.1 Existing Conditions

3.1.1.1 Surface Conditions

The site is located in an approximately 40-square-mile geographic area in Whatcom County known as the Mountain View Upland. This area is a hilly region with a maximum elevation of approximately 385 feet above mean sea level. Surface water bodies in the upland include Lake Terrell and several wetlands. These water bodies are attributed to poor drainage resulting from the presence of low-permeability soils. Several small creeks and ditches, most of which are dry in the summer months, drain the upland.

3.1.1.2 Geology

The site and the upland are both located within the Puget Sound Lowland, a north-south trending structural and topographical depression bordered on the west by the Olympic Mountains and Vancouver Island, and on the east by the Cascade Mountains. This area is underlain by Tertiary volcanic and sedimentary bedrock and is filled to the present-day land surface with Quaternary glacial and non-glacial sediments. Depth to bedrock is 400 to 800 feet below the earth's surface at the project site.

Deposits of several glaciations have been identified in the northern portion of the lowland. The youngest glaciation was the Fraser, which included several glacial advances or stades, separated by interstades. The youngest stade of the Fraser glaciation was the Sumas, while the oldest was the Vashon. During the stades, lobes of glacial ice emanating from the British Columbia Coast Ranges entered the lowland and covered the entire area with up to several thousand feet of ice.

Fluvial, lacustrine, and direct ice contact processes associated with the advance and recession of the Fraser glaciation were responsible for the majority of the surface deposits and landforms throughout the lowland, including the area proposed for the cogeneration facility. During ice recession in the Fraser glaciation, relative sea level was several hundred feet higher than at present in the northern and central portions of the lowland, including Whatcom County. Accordingly, floating ice in the form of bergs and shelves covered much of the area. Sediment entrained within the ice accumulated on the floor of Puget Sound as the ice melted. As the sea level lowered, the accumulated sediment remained as glaciomarine drift, which now mantles much of Whatcom County.

Following is a discussion of the two major geologic deposits identified in the area of the proposed cogeneration facility based on a review of a published geologic map (Easterbrook 1976). The deposits are presented from the oldest to the most recent.

Bellingham Glaciomarine Drift

Bellingham Glaciomarine Drift is part of the Sumas stade, and typically consists of a medium dense, nonsorted, nonstratified pebbly sandy silt and pebbly clay. The deposit ranges between 10 and 70 feet thick. Bellingham drift has low permeability and is present at the land surface over a large portion of the upland surrounding the project site.

Sand and Gravel Overlying the Bellingham Drift

Stratified sand and gravel overlie the Bellingham Drift both to the east and west of the BP Cherry Point refinery. This deposit, which is non-glacial, was probably formed by waves that reworked the Bellingham Drift and removed most of the fine sediments. The deposit is typically loose and consists of well-sorted medium to coarse sand with some layers of clay, silt, and gravel. The sand is highly permeable and has a maximum thickness of about 10 feet.

Localized peat deposits occur in the upland in closed topographic depressions. The peat deposits range in thickness from a few feet up to 35 feet.

3.1.1.3 Seismicity

Historically, the Puget Sound region has been subjected to frequent earthquakes of moderate intensity. The area is indicated in the Uniform Building Code as Seismic Zone 3. Three deep earthquakes that resulted in significant damage occurred in 1949 and 2001 near Olympia and in 1965 near Seattle. The April 13, 1949 earthquake is the largest recorded in the region, reaching a Richter magnitude of 7.1. It was observed over 150,000 square miles and resulted in eight deaths and many injuries. The recent February 28, 2001 Nisqually earthquake had a Richter magnitude of 6.8, which resulted in damage to structures, soil liquefaction, and slope failures. The April 29, 1965 earthquake (Richter magnitude 6.5) was observed over 130,000 square miles and resulted in widespread damage in the Seattle area.

In addition to the deep earthquake faults, several shallow faults also are being delineated in the Puget Sound area. According to an unpublished paper by Easterbrook (2000) and suggested for evaluation by Whatcom County Planning Department, the Vedder Mountain and the Sumas draft faults extend across Whatcom County in a southwesterly direction. Both faults may be active based on earthquakes that have occurred since 1909 along the fault traces. The maximum magnitude of the shallow earthquakes was 6.0, occurring in 1909 in the San Juan Islands. Several other shallow faults have been identified south of Whatcom County in the central Puget Sound area. The maximum earthquake magnitudes predicted for these faults are between 6.1 and 7.1. Ground shaking associated with either deep or shallow earthquakes could affect the proposed cogeneration facilities.

3.1.2 Environmental Issues of the Proposed Project

Only a few earth issues have been identified based on a review of the project information received from BP; meetings with agencies, Indian tribes, and non-governmental organizations; and comments received from the interested public both in writing and from the

public meeting. Based on this information and the independent consultant's review, this section describes these issues and their relevance to the BP Cherry Point Cogeneration Project.

3.1.2.1 Construction

Whatcom County

According to discussions with the Whatcom County Planning Department (Gunther 2001), the proposed facility, if not under EFSEC jurisdiction, would need a county building permit. A clearing and grading permit also would be required, but would be part of the building permit. In addition, a SEPA review and a Conditional Use Permit would likely be needed because of the size of the project. General thresholds for SEPA review include more than 500 cubic yards (CY) of land disturbance and greater than 12,000 square feet of building construction. According to its personnel, the County does not have specific code requirements for performing earth studies, although some studies or information would be required for the above permits or reviews. Such information could include a geotechnical study, the extent of construction area and size of the structures, the amount of earthwork including estimated cut-and-fill quantities, and a seismic hazard evaluation.

Bonneville Power Administration

Regulatory concerns in regard to earth issues were discussed with the BPA (McKinney 2001). Because a System Impact Study has not been completed by the BPA, the effect of interconnecting and transmitting the proposed power in the system cannot be quantified. Therefore, BPA has no comments in regard to earth issues until the study is completed. BPA estimates the System Impact Study will be completed in December 2001.

Erosion

Erosion potential for the proposed facility is an issue because of the proximity of sensitive wetlands and Terrell Creek. This issue is discussed further in the water quality and fisheries sections (Sections 3.3 and 3.6).

Slope Stability/Foundation Conditions

Slope stability should not be an issue for the proposed cogeneration facility because the site is relatively flat. Likewise, foundation conditions, while needing to be properly evaluated during facility design, do not appear to be unusual or difficult, particularly given the extensive development that has already occurred at the refinery.

3.1.2.2 Operation and Maintenance

The primary long-term earth issue identified for operation of both the proposed cogeneration facility and the transmission line and natural gas pipeline connections is seismicity. However, this is more of a design issue and may not be any more significant for the proposed cogeneration facility than for other industrial developments in the area. The implications of seismic damage, if not properly incorporated in the design of the facility,

relate primarily to health and safety. There may also be socioeconomic issues related to disruption of the power supply.

3.2 Air Quality

Air quality impact from the proposed project is the environmental issue that has received the most attention from agencies and the public. This section provides a context for why air quality is a concern for the proposed BP Cherry Point Cogeneration Project. As a thermal power plant burning fossil fuels, the proposed project would be a major source of air pollutants, especially the primary pollutants defined in the National Ambient Air Quality Standards (NAAQSs). As a major source (as defined in the Clean Air Act, P.L. 88-206, 95-95 and 101-549, as amended), the proposed plant must go through a New Source Review process, which includes review under the federal Prevention of Significant Deterioration regulations.

3.2.1 Existing Conditions

3.2.1.1 Cogeneration Plant Site

The proposed project is located next to an existing petroleum refinery, and existing air emissions always need to be considered. BP maintains an air quality management program for existing sources as mandated by existing emission permits. BP has indicated that the proposed cogeneration plant would result in the permanent decommissioning of several existing sources within the refinery complex, including three package boilers, 14 Solar Taurus 5.5-mW simple-cycle gas turbine electrical generators, and possibly some other unspecified equipment.

3.2.1.2 Existing Meteorology and Air Quality

Pollutants released by the refinery, the proposed project, and other sources of air pollutants in the area are transported by air movement from the source to downwind receptors. To understand and determine the movement of these pollutants, knowledge of meteorological conditions unique to the Cherry Point area is needed. There is extensive available meteorological data for the areas near the plant site. BP has operated a meteorological tower at the refinery for more than five years and can provide at least three years of recent hourly wind and temperature data.

3.2.1.3 National Ambient Air Quality Standards

Ultimately, the proposed project must protect air quality, as determined in part by achieving and maintaining air quality standards. The state of Washington has adopted the NAAQSs and more stringent state standards listed in Table 2-1. The NAAQSs include primary standards designed to protect public health and secondary standards designed to protect public welfare from impacts such as damage to property and vegetation.

Natural gas combustion from the cogeneration plant would produce emissions of NO_x, sulfur dioxide (SO₂), CO, particulate matter (PM), as well as CO₂ and unburned hydrocarbons. In addition, ammonia would be released from the proposed plant in small quantities by slip

through the SCR system for NO_x control. This pollutant is not by definition a primary air pollutant and no NAAQS exists for it.

Table 2-1. Ambient Air Quality Standards and Prevention of Significant Deterioration Increments

Pollutant	National Primary	National Secondary	State of Washington	Class I PSD Increments	Class II PSD Increments
Total Suspended Particulate Matter (TSP)					
Annual Geometric Mean			60 µg/m ³		
24-hour Average			150 µg/m ³		
Inhalable Particulate Matter (PM₁₀)					
Annual Arithmetic Mean	50 µg/m ³	50 µg/m ³	50 µg/m ³	1 µg/m ³	17 µg/m ³
24-hour Average	150 µg/m ³	150 µg/m ³	150 µg/m ³	5 µg/m ³	30 µg/m ³
Inhalable Particulate Matter (PM_{2.5})					
Annual Arithmetic Mean	15 µg/m ³	15 µg/m ³			
24-hour Average	65 µg/m ³	65 µg/m ³			
Sulfur Dioxide (SO₂)					
Annual Average	0.03 ppm		0.02 ppm	1 µg/m ³	20 µg/m ³
24-hour Average	0.14 ppm		0.10 ppm	5 µg/m ³	91 µg/m ³
3-hour Average		0.5 ppm		25 µg/m ³	512 µg/m ³
1-hour Average			0.40 ppm ^a		
Carbon Monoxide (CO)					
8-hour Average	9 ppm		9 ppm		
1-hour Average	35 ppm		35 ppm		
Ozone (O₃)					
1-hour Average ^b	0.12 ppm	0.12 ppm	0.12 ppm		
8-hour Average	0.08 ppm				
Nitrogen Dioxide (NO₂)					
Annual Average	0.05 ppm	0.05 ppm	0.05 ppm	1 µg/m ³	25 µg/m ³
Lead (Pb)					
Quarterly Average	1.5 µg/m ³	1.5 µg/m ³	1.5 µg/m ³		
µg/m ³ = micrograms per cubic meter; ppm = parts per million Annual standards never to be exceeded; short-term standards not to be exceeded more than once per year unless otherwise noted. (a) 0.25 not to be exceeded more than twice in seven days (b) Not to be exceeded on more than one day per calendar year as determined under the conditions of WAC 173-475.					

The Washington State Department of Ecology (Northwest Regional Office) has jurisdiction over air quality permitting in Whatcom County for projects requiring PSD permits. Northwest Air Pollution Authority (NWAPA) has primary responsibility for Title V permitting and compliance monitoring of sources. However, for projects under the jurisdiction of EFSEC, the EPA has delegated joint responsibility for issuing air permits to EFSEC.

Ecology maintains a network of air quality monitoring stations in Western Washington. These stations sample air quality in areas that may have experienced higher levels of air pollution than other areas. Currently, four air quality monitoring stations are in the Whatcom County area. Three of these monitors are located in Bellingham and are probably not representative of the air quality in the Cherry Point area. One air quality monitoring

station is located on Loomis Trail Road in the town of Custer near the project site. This station could provide useful information; however, it only monitors ozone, a derived pollutant and not one directly emitted by the refineries or other sources in the area.

Based on air quality monitoring information collected over a period of years, EPA designates regions as “attainment” or “nonattainment” areas for particular pollutants. Attainment status is a measure of whether air quality in an area complies with the federal health-based ambient air quality standards shown in Table 2-1. The area around the site is classified attainment for all criteria pollutants.

3.2.1.4 *Odor*

The project site is currently unused wetland area with a history of pasture land use adjacent to the existing petroleum refinery. The refinery has the highest potential sources of odor in the immediate project vicinity. No air quality standards exist for odor.

3.2.1.5 *Greenhouse Gas Emissions*

Greenhouse gases trap solar radiation in the atmosphere and prevent it from radiating back into space. This trapping is attributed as a primary cause of global warming.

The refinery is a large existing source of carbon dioxide and a much smaller source of other greenhouse gases such as methane. Some of the significant CO₂ sources are the existing package boilers and Solar Taurus gas turbines, which BP reports would be decommissioned when the proposed cogeneration plant commences operation. Other significant CO₂ sources at the refinery include numerous heaters used in the refining process. These would not be affected by the proposed project.

3.2.2 *Environmental Issues of the Proposed Project*

3.2.2.1 *Regulatory Concerns*

As demonstrated in Chapter I, air quality issues received by far the most comments from the public and agencies contacted during preparation of the Potential Site Study. Agency comments generally indicated that the air quality analysis performed for the project needs to be thorough both from the emissions/control technology and the air quality impacts prediction (pollutant dispersion modeling) standpoints. Although BP is proposing to have the PSD permit application stand alone, there is much interest from all the agencies, Indian tribes, and the public regarding potential offsets of emissions from the shutdown of existing refinery units when the cogeneration plant commences operations. Federal land managers are concerned over potential impacts on the Class I areas (pristine areas) closest to the project.

Ecology would like BP to carefully document the potential for the proposed plant to emit greenhouse gases, and this is echoed by public concerns over global warming. The agency is also concerned that the use of emergency liquid fuels be limited because of their potential to have higher emissions.

In particular, Canadian agencies and citizens voiced numerous concerns regarding the potential for the proposed project to cause air quality impacts in Canada, and they want to be sure that BP includes receptors in Canada in any air quality modeling that is performed. Because of their intensive involvement with the Sumas Energy 2 Project proposed near Sumas, the Canadians are fully involved in following energy project developments in Whatcom County and cumulative effects of such projects in western Washington. There is concern that proposed projects would further degrade air quality and visibility (regional haze) in the Fraser River Valley. They are concerned over both criteria pollutants (particularly ozone and PM_{2.5}) as well as toxic air pollutants. In addition, Canadians have voiced strong support for mitigation of greenhouse gas emissions for new projects.

3.2.2.2 Construction

Cogeneration Plant Site

Construction of the generation plant and associated facilities at the plant site, including the 230-kV electrical transmission lines and natural gas pipeline connections, would generate air pollutants. Construction activities would occur at varying levels of intensity for up to 24 months or so.

Excavation would be required to provide the desired grade and elevation. This activity would be completed early in the construction process. Dust generation could normally be controlled by spraying water at excavation and fill sites. The site preparation process is not expected to produce a significant amount of airborne dust. In summary, dust generated by excavation and grading activities would be minor and limited primarily to two or three months of the earthmoving operations.

In addition, truck and equipment traffic across portions of the site that are not paved or covered with gravel during construction could generate dust. These areas could also be periodically sprayed with water to minimize dust release. The impact of this release of dust would likely be highly localized, temporary, and not significant.

Some of the machinery (such as compressors and generators) and heavy equipment (such as loaders, bulldozers, and trucks) normally used to construct such facilities would be powered by internal combustion engines. While such engines emit the byproducts of combustion, these emissions would be temporary and resulting offsite air quality impacts would normally not be significant.

Construction of the generation plant would also include activities that could generate odors. If oil-based paints are applied to structures or equipment at the site, paint odors may be perceptible nearby. Some of the site could be paved with asphalt, and asphalt fumes may be perceptible for a short period during the paving operation. These impacts are expected to be of short duration and would not be significant since there are few people nearby who would notice a change in odor.

Transmission Lines

The 230-kV electrical transmission lines would be installed by constructing access roads and excavating footings for the transmission towers. Minor amounts of dust would be generated during excavation and backfilling. Such impacts would be of short duration and not significant. Impacts would last only as long as the construction period, two to three months.

As at the plant site, the excavation area and backfill operations would normally include spraying with water to minimize dust release.

3.2.2.3 Operation and Maintenance

Emissions

The proposed cogeneration facility is located next to the existing BP Cherry Point Refinery. Although new air emissions will be associated with the proposed facility, the integration between the proposed facility and the refinery would also allow BP to significantly reduce the emissions associated with the existing refinery. Table 2-2 compares preliminary estimates of the criteria pollutant emissions expected from the proposed facility with anticipated offsetting reductions in refinery emissions. The preliminary data indicate that the cogeneration facility would result in a net reduction in the total amount of criteria pollutant emissions.

Table 2-2. Comparison of Anticipated Project Emissions and Offsetting Emission Reductions

Criteria Pollutant	Estimated Emissions from Proposed Cogeneration Facility (tons/year)	Estimated Reductions in Refinery Emissions (tons/year)
NO _x	240	550
CO	120	130
SO ₂	70	70
VOC	70	10
PM ₁₀	200	30
Total	700	790
Source: BP August 24, 2001.		

These emission and offset estimates are preliminary and approximate, given the ongoing process of facility design. As the design of the facility evolves, more definitive emission information will become available. Based on this information, the proposed cogeneration facility by itself could result in emissions greater than the PSD thresholds for NO_x, CO, SO₂, PM₁₀ and volatile organic compounds (VOCs). Table 2-3 presents the significant emission rates established for PSD permits. In meetings with Ecology, BP officials have indicated that they expect to submit a PSD permit that would not be based on offset emissions of criteria pollutants from the refinery.

Table 2-3. Estimated Significant Emission Rates

Criteria Pollutant	Estimated Project Emission Rate (tons/year)	Significant Emission Rate (tons/year)	Significance Criteria Potentially Exceeded?
NO _x	240	40	Yes
SO ₂	70	40	Yes
PM ₁₀	200	15	Yes
VOC	70	40	Yes
CO	120	100	Yes
Source: BP August 24, 2001.			

In addition, gas-fired combustion turbines have the potential to emit small quantities of hazardous air pollutants, including compounds such as ethylbenzene, benzene, naphthalene, and toluene, among others. However, BP expects that the cogeneration facility would allow modifications at the refinery that would result in offsetting reductions in these hazardous air pollutants.

The potential to exceed estimates shown in Table 2-3 assumes that NO_x emissions are controlled using a combination of dry low-NO_x combustors in the gas turbines. Dry low-NO_x combustors are designed to maintain a fuel-to-air ratio where the quantity of oxygen in the air introduced into the combustion process is just sufficient to allow the fuel to burn. This “lean” ratio results in a relatively cool combustion zone. NO_x is typically produced at high temperatures; therefore, the lower temperature in the combustion zone would minimize NO_x production.

In addition to dry low-NO_x combustion, each HRSG would be furnished with a complete SCR system to control concentrations of NO_x generated by the combustion turbine and duct firing. Anhydrous ammonia would be used in the SCR system for NO_x control. The SCR catalyst reactor would be located in a temperature zone of the HRSG intended to optimize the performance of the catalyst at all normal operating loads and ambient temperatures. The rate of ammonia injection would be governed by the inlet NO_x concentration, as measured by a continuous emissions monitoring system. Injections of ammonia would be adjusted at the lowest possible rate to maintain the required outlet NO_x concentration. The ammonia slip, or level of unreacted ammonia, from the SCR should be minimized through good operating practices and proper instrumentation. BP estimates ammonia emissions would be 180 tons per year (Torpey August 22, 2001).

As mentioned earlier, preliminary estimates indicate that even with dry low-NO_x combustion, and SCR, emissions from the proposed facility would exceed the PSD significant emission rates for NO_x, SO₂, PM₁₀, VOC, and CO (Table 2-3).

Ecology has voiced concern that proper attention be paid to emissions that would be generated by the cogeneration plant during startups. For these brief periods, the emissions control equipment is not functioning at its optimum capability. Frequent startups have the potential to significantly increase annual emissions. BP, however, intends to operate the cogeneration plant as a base-loaded facility, and as such startups and shutdowns would be minimized.

Air Quality

To date, no air quality modeling has been conducted for the project to examine its impacts on Class I or Class II PSD areas. The Class I areas closest to the project site, and the only ones within 120 miles, are:

- Olympic National Park,
- Mount Rainier National Park, and
- North Cascades National Park.

Although Canada is not covered by U.S. air quality regulations, there are air quality issues in British Columbia, particularly in the Fraser River Valley north and east of the project area.

Ecology, EPA Region 10, and the Federal Land Managers have provided input regarding PSD permitting and air quality modeling. Air quality models suggested for use are the ISCST3 and CALPUFF models. The receptor grids for these models should extend into British Columbia, Canada, to assist in evaluating potential impacts in the Fraser River Valley.

Odor

The proposed project would use ammonia, which, if released into the atmosphere in sufficient concentrations, can have a detectable odor. Other pollutants generated by the cogeneration plant would not have significant odors at the property boundaries in the concentrations that would likely be generated.

3.3 Water

The proposed 750-mW cogeneration facility would use three natural gas turbines with electric generators and three heat recovery steam generators. BP assumes the condensing technology would be air cooling, which would not require use of cooling water. Water would primarily be needed to generate steam and replace what is lost through blowdown. Additional potable water would also be needed for facility personnel, and the total amount of wastewater discharged offsite would likely increase under this project. The BP refinery is currently served by Whatcom County PUD No. 1 through an existing pipeline, which BP reports could provide sufficient additional water for the proposed cogeneration plant through its existing contract.

3.3.1 Existing Conditions

3.3.1.1 Surface Water

The proposed cogeneration facility is located within a gently rolling approximately 40-square-mile area known as the Mountain View Upland (Washington Division of Water Resources 1960). Surface water bodies on the upland consist of Lake Terrell, numerous wetlands (see Section 3.4), and minor streams (USGS 1972). The wetlands are attributed to poor drainage resulting from the presence of closed topographical depressions in areas of low-permeability surficial soils (Easterbrook 1973a). The nearest significant surface water drainage is Terrell Creek. The Nooksack Tribe has indicated that Terrell Creek has water quality problems (Dorimus 2001). Whatcom County's largest river, the Nooksack River, is 7 to 8 miles east of the facility at its closest point.

3.3.1.2 Groundwater

The upland is underlain by hundreds of feet of interbedded unconsolidated deposits that overlie bedrock (Newcomb 1949; Easterbrook 1973b, 1976, 1994). These deposits were formed by a sequence of glacial and non-glacial processes. The majority of the surficial soil was deposited primarily in a quiet water marine environment, resulting in predominantly fine-grained, low permeability soil. Deposits of older glacial and non-glacial episodes underlie the surficial soils.

Aquifers and Aquitards

Aquifers generally occur in the coarser grained deposits associated within glacial drift sequences and intervening non-glacial sequences. Non-glacial sequences typically contain relatively permeable sand beds, which comprise aquifers. Sand and gravel deposits associated with the advance and retreat of glacial ice also typically have high permeabilities and

therefore comprise aquifers. These aquifers are separated and bounded by finer grained deposits that act as aquitards. In the Whatcom County area, much of the glaciomarine drift is fine grained and acts as an aquitard.

Specific Aquifers and Aquitards near the Site and in Surrounding Areas

The following provides a brief description of some geologic deposits relative to groundwater issues in the area listed from oldest to youngest.

Kulshan Glaciomarine Drift - The Kulshan Glaciomarine Drift was deposited during the Fraser glaciation and consists of unsorted and unstratified till-like sediments. Till is a sediment deposited directly by glacial ice and consists of pebbles and cobbles in a matrix of sand, silt, and clay, also referred to as diamicton. The Kulshan drift is interpreted as being deposited during recession of glacial ice in the Puget Sound Lowland. Sea level rose during this glacial recession and marine waters rafted the remaining ice, which is believed to have been hundreds of feet thick. The deposit was formed as debris was released from the melting ice blocks and accumulated on the sea floor. Shells of clams and other marine mollusks present on the sea floor beneath the floating ice were buried in the sediment and became fossils. Both the Kulshan drift and till have low permeability and together comprise an aquitard.

Deming Sand - The Deming Sand consists of well-sorted medium to coarse sand with some layers of clay, silt, and gravel. The sand is non-glacial and is interpreted as being deposited in fluvial and beach environments when sea level dropped subsequent to deposition of the Kulshan drift. The sand is highly permeable and locally forms an aquifer.

Bellingham Glaciomarine Drift - The Bellingham Glaciomarine Drift was deposited during a later stage of the Fraser glaciation and has a composition similar to the Kulshan drift. The Bellingham drift also was deposited when the sea level rose and icebergs floated into the area. The icebergs deposited sediment on the sea floor analogous to the deposition of the Kulshan drift as previously discussed. The Bellingham drift has low permeability and is considered an aquitard. The Bellingham drift is present at the land surface over the majority of the upland. A thin layer of stratified sand and gravel overlies the Bellingham drift in an approximately 15-square-mile area primarily in the south-central portion of the upland. These sediments are interpreted as Bellingham drift, which was reworked by wave action when sea level was higher than at present, resulting in removal of the fine sediment fraction. The sand and gravel is less than 10 feet thick. Localized peat deposits occur on the upland in closed topographic depressions.

3.3.1.3 Wastewater

Three wastewater systems are currently in use at the refinery: sanitary, stormwater, and oily water. All three systems eventually combine in a discharge pond after treatment and are discharged into the Strait of Georgia through an NPDES-permitted outfall. The outfall reportedly consists of a diffuser situated at the end of the BP (ARCO) pier on the sea floor at a depth of about 65 feet. Currently, BP is constructing a pipeline to the Birch Bay Waste Water Treatment Plant and all plant sanitary wastewater will be sent there for treatment upon completion.

3.3.1.4 *Water Supply*

The Nooksack River provides a substantial volume of the area's water supply. Whatcom County PUD No. 1 obtains water from this source (Anderson 2001). Groundwater is also used, however, particularly at many of the area's more isolated homes and farms and on the Lummi Indian Nation Reservation. The City of Blaine also obtains groundwater from a local wellfield (Thielman 2001). Sufficient groundwater for domestic supply is generally present throughout the upland with the first major water-bearing zone present near sea level.

Process water for the BP plant is provided through Whatcom County PUD No. 1. The refinery currently uses an average of about 6.5 million gallons per day (gpd), but has a contract for up to 11 million gpd from the PUD (Anderson 2001). Potable water is provided by the Birch Bay Water and Sewer District, which receives water from the City of Blaine.

3.3.2 *Environmental Issues of the Proposed Project*

Based on a review of the project information received from BP; meetings with agencies, Indian tribes, and non-governmental organizations; and comments received from the interested public both in writing and from the public meeting, a number of issues related to water supply, water quality, surface water, and groundwater were raised. Concern was voiced by the public, Indian tribes, and regulatory agencies regarding the potential use of water for cooling purposes at the plant, wastewater discharge, and its potential impacts on fish and wildlife, groundwater impacts, and impacts on wetlands. For wastewater generated by the proposed cogeneration plant, there is concern about how it would change the refinery's existing NPDES permit and the temperature of the discharge into Puget Sound, particularly since these have the potential to affect fish.

This section describes the issues identified and their relevance to the BP Cherry Point Cogeneration Project. Following the agency and public meetings in May 2001, BP modified its project concept to eliminate water-cooling technology in place of air-cooling technology for condensing steam.

3.3.2.1 *Construction*

The Whatcom County Planning Department identified protection of surface water during construction as an issue of concern (Gunther 2001). Specific concerns include erosion and sedimentation control, as well as water quality during and after construction.

3.3.2.2 *Operation and Maintenance*

Regulatory Issues

A myriad of federal, state, and local regulations and regulatory bodies govern surface and groundwater withdrawal, use, and discharge. EFSEC also has regulations governing water use that need to be addressed in applications for new power facilities. EFSEC rules supercede local and state regulations, but not federal regulations. Normally, EFSEC would seek to ensure that permitting for new power plants is consistent with the appropriate requirements contained in the local and state regulations.

Key surface water regulations potentially applicable to this project include:

- EFSEC WAC 463-42-205 Proposal – Spillage prevention and control;
- EFSEC WAC 463-42-215 Proposal – Surface-water runoff;
- Whatcom County Surface Water Ordinance (Gunther 2001);
- Washington Department of Ecology WAC 173-201A, Water quality standards for surface waters of the state of Washington; and
- Washington Department of Ecology WAC 173-220A, National Pollutant Discharge Elimination System permit program.

Key groundwater regulations could include:

- Whatcom County Sensitive Area Regulations (Gunther 2001); and
- Washington Department of Ecology WAC 173-200, Water quality standards for ground waters of the state of Washington.

Key wastewater regulations potentially applicable to this project include:

- EFSEC WAC 463-42-195 Proposal – Wastewater Treatment; and
- Washington Department of Ecology WAC 173-240, Submission of Plans and Reports for Construction of Wastewater Facilities.

Key drinking water regulations could include:

- EFSEC WAC 463-42-165 Proposal – Water Supply System; and
- Washington Department of Health, WAC 246-290, Group A Public Water Systems.

Surface Water

Changes in the volume and quality of surface water discharged through the existing NPDES-permitted outfall is an important issue identified by both regulatory agencies and the public for this project. Specific potential concerns include impact of increased salinity and temperature on the herring population (Ecology 2001), the age and condition of the existing diffuser, and cumulative impacts on water quality (public comment at May 2 public meeting). Further consideration appears necessary concerning how the NPDES permit would be revised given that EFSEC only has jurisdiction over the power facility portion of total flows. A separate NPDES permit or a specific discharge point for the cogeneration plant may be required (Ecology 2001).

Stormwater runoff from the proposed cogeneration facility site currently may or may not drain into Terrell Creek and the wetland mitigation area north of Grandview Road (see Section 3.4). It is important that untreated stormwater does not enter the mitigation area north of Grandview Road or the channel that drains to Terrell Creek. The Antidegradation Policy (WAC 173-201A-070) contained within the Washington State Surface Water Quality Standards, which are the means for implementing the Water Pollution Control Act, clearly states that “existing beneficial uses (of waters of the state including wetlands) shall be maintained and protected and no further degradation which would interfere with or become injurious to existing beneficial uses shall be allowed”. Thus, only treated stormwater should be discharged to any waters of the state, both on and offsite. In addition, it is important that any additional stormwater generated as a result of increased impervious surfaces does not enter wetlands and streams, as this can also alter the functions of those waters.

Groundwater

The Whatcom County Planning Department (Gunther 2001) and some members of the public identified protection of sensitive groundwater recharge areas as a potential issue. The Lummi Indian Nation also may be concerned about potential impacts on groundwater quality given their historical involvement with this issue. Whether or not such “sensitive groundwater recharge areas” occur at the project site is currently unknown.

Wastewater

The public and Ecology identified wastewater discharge to surface water associated with the NPDES-permitted outfall (see surface water discussion above) as an issue of concern. Given that the total amount of process water and sanitary flows are likely to increase under the proposed project and that the combined water quality may change, the overall issue of wastewater discharge is an important issue to be analyzed.

Water Supply

Under the current proposal for the BP Cherry Point Cogeneration Plant, air cooling would be used. No water would be used for condensing in a cooling tower. Makeup water would still be needed for steam consumed by the refinery. Whatcom County PUD No. 1 reportedly has no concern with BP increasing its current usage from 6.5 million gpd up to a maximum of 11 million gpd (Anderson 2001) for process water (more than would be needed for steam makeup only). This withdrawal of water from the Nooksack River is apparently within the PUD’s existing water right, although this issue has been questioned by the Nooksack Tribe. There may be concern from the WDFW, Ecology, the Lummi Indian Nation, and other Indian tribes, however, over minimum instream flows given the increasing statewide concern over habitat and endangered species protection.

Increased use of potable water may also be an issue, depending on the status of water availability from the Birch Bay Sewer and Water District (Thielmann 2001). Such issues could relate to resource limitations or infrastructure. This issue alone is not expected to be highly significant, however, because of the relatively small number of staff proposed for the facility.

Reuse of treated water from the Birch Bay Water and Sewer District treatment plant has been mentioned as a possible option for process water. The City of Blaine is also considering sending additional flow to the Blaine treatment plant, making even more treated water potentially available for reuse. While sanitary water reuse is an attractive option from the standpoint of optimizing a limited resource, a number of potential issues would need to be addressed including quality of wastewater discharge through the NPDES permitted outfall and impact on the receiving waters.

The Washington Department of Health has indicated that it would be concerned only if there is some perceived risk to the quality of potable water as a result of the proposed project (Thielmann 2001).

Floodplains

According to Federal Emergency Management Agency (FEMA) maps, the plant site is not within the 100- or 500-year floodplains and therefore flooding should not be an issue.

3.4 Wetlands, Vegetation, and Agricultural Crops

This section presents information and provides a framework for the analysis of wetland, vegetation, and agricultural crop issues associated with development of the proposed cogeneration plant. Issues addressed in this section related to the approximately 25-acre cogeneration plant site, natural pipeline connections, and the approximately 1-mile new electrical transmission line. Most of these facilities would be located west of Ferndale in Whatcom County, Washington.

Wetlands are defined by the state and the Corps as follows:

“Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas” (WAC 173-22-080, 33 CFR 328.3, 40 CFR 230.3)

Wetland plant community types referred to in this section are based on the U.S. Fish and Wildlife Service wetland classification system (Cowardin et al. 1979) and include palustrine emergent temporarily flooded (PEMA), palustrine emergent seasonally flooded (PEMC), palustrine forested temporarily flooded (PFOA), and palustrine open water permanently flooded excavated (POWHX).

3.4.1 Existing Conditions

3.4.1.1 Cogeneration Plant Site

A discussion of the criteria and constraints used to identify the proposed cogeneration plant site is provided in the Section 2.0, Description of the Proposed Project.

Wetlands

Wetlands were observed at the plant site during a field reconnaissance (May 2-3, 2001). In addition, the U.S. Fish and Wildlife Service National Wetland Inventory maps show PEMA, PEMC, PFOA, and POWHX wetlands in the vicinity of the site. All of these wetlands types were observed during the field reconnaissance. Soils on the site include Birch Bay silt loam, Hale silt loam, Kickerville silt loam, Labounty silt loam, Whatcom silt loam, and Whitehorn silt loam. Hale silt loam, Labounty silt loam, and Whitehorn silt loam are classified as hydric. Hydrophytic vegetation and indicators of wetland hydrologic conditions have been identified within the plant boundaries.

Much of the proposed 25-acre cogeneration plant site includes a mosaic of emergent and forested wetland. It is unlikely that all of the existing wetland can be avoided for the development of a cogeneration plant at the proposed site. The exact footprint of the cogeneration plant is being finalized. BP is currently preparing a wetland delineation report.

At the proposed cogeneration plant site, the following wetland issues should be determined:

- Delineate wetlands using the U.S. Army Corps of Engineers' Wetland Delineation Manual (1987) and the Washington State Wetland Identification and Delineation Manual (1997).

- Categorize wetland systems. Washington Department of Ecology has recommended using its Washington State Wetlands Rating System (1993).
- Complete wetlands classification, buffer, and mitigation ratios using a method acceptable to regulatory agencies (i.e., Corps, Ecology, and Whatcom County).
- Determine the functional attributes of the onsite wetlands. Washington Department of Ecology has recommended using its Washington State Functional Assessment Method (1999) or other approved method.
- Washington Department of Ecology staff members have requested that they be included in pre-study coordination.
- Washington Department of Ecology has requested the opportunity to review project plans, alternatives analysis, wetland delineations, wetland impacts, and proposed conceptual mitigation plans.

Vegetation

The proposed project site lies within the Pacific Northwest's *Tsuga heterophylla* zone (Franklin and Dyrness 1988) and is generally characterized by a wet, mild, maritime climate.

The existing site has been affected by land management and was converted to pasture, hay, or crop cultivation some time ago. The current conditions of grassland and pioneer shrub and tree species have grown since the area was taken out of cultivation. Planting and colonization of trees and shrubs have occurred on the site.

Information on federally listed threatened and endangered species has not yet been obtained from the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS). Information on state priority species and habitats has not been obtained from Washington Department of Fish and Wildlife (WDFW) and Washington Department of Natural Resources (WDNR). Contact letters for federal and state threatened and endangered species along with priority species and habitats should be submitted for this project.

At the proposed cogeneration plant site, the following vegetation issues should be addressed:

- Determine and map the vegetation types.
- Determine the exact footprint and location for the cogeneration plant.
- Determine the area of each vegetation type affected by development of the cogeneration plant.
- Obtain information on state priority species and habitats from WDFW and WDNR.
- If necessary, conduct field surveys for endangered, threatened, or sensitive plants on the cogeneration plant site.

Agricultural Crops

Areas of the proposed cogeneration plant site have been used as agricultural croplands. It is assumed that since BP purchased the land, it has not been used for agriculture. An area adjacent to Grandview Road was planted with hybrid poplars in the early 1990s. While the trees were planted as a visual buffer around the BP refinery, they could be commercially harvested. It has not been determined if these trees would be retained for visual cover or commercially harvested.

3.4.1.2 *Electrical Transmission Corridor*

Wetlands

Wetland characteristics of the electrical transmission line corridor are similar to the characteristics observed at the cogeneration plant site. An existing transmission line corridor has been permitted but not built for BP along the desired alignment. It is expected that this corridor would be modified for use with the cogeneration plant. Wetlands have been identified along this corridor, and mitigation has been identified for impacts. Additional impact on wetlands should be assessed as suggested for the plant site.

Much of the electrical transmission line corridor includes a mosaic of emergent and forested wetland. It is unlikely that all of the existing wetland can be avoided for the development of the transmission towers and access road. The exact footprints of the transmission towers and access road along with modification necessary for use with the cogeneration plant are not available at this time.

Along the proposed electrical transmission corridor, the same wetland issues listed in the Section 3.4.1.1, Cogeneration Plant Site, should be determined.

Vegetation

The project site lies within the Pacific Northwest's *Tsuga heterophylla* zone (Franklin and Dyrness 1988) and is generally characterized by a wet, mild, maritime climate.

Like the cogeneration plant site, the permitted electrical transmission line corridor has been affected by land management and has been converted to pasture, hay, or crop cultivation. The current condition is grassland and young forest. Most of the grassland is no longer in cultivation. There are areas along the electrical transmission corridor where vegetation has been removed for a railroad line and for a wood treatment facility.

Along the proposed electrical transmission corridor, the same vegetation issues listed in Section 3.4.1.1, Cogeneration Plant Site, should be determined.

Agricultural Crops

Areas along the permitted electrical transmission corridor have not been used as agricultural cropland for approximately 10 years. Most of the grassland is no longer in cultivation.

Along this electrical transmission corridor, the same agricultural crop issues listed in Section 3.4.1.1, Cogeneration Plant, should be determined.

3.4.2 *Environmental Issues of the Proposed Project*

3.4.2.1 *Construction*

Impacts during construction at the proposed cogeneration plant, along the electrical transmission lines, and at the natural gas pipeline connections would involve direct disturbance to vegetation by heavy equipment, vehicular traffic, and crew activities. The

disturbances would include clearing of vegetation, excavating, filling, grading, trenching, and compacting vegetation and soils. Permanent loss of vegetation could include wetlands, forest, shrubs, and pastureland. Unless preventive measures are taken, exposure and compaction of soils could encourage colonization of weedy species adapted to disturbed sites.

Cogeneration Plant Site

Wetlands

These recommendations assume that the construction of the cogeneration plant would affect some wetlands on the proposed site. Recommended criteria for wetland impacts, classification, mitigation, and monitoring are identified below.

- Recommended priority for wetland impacts are: avoidance, minimization, reduction, and compensation, in this order. Ecology has recommended using the above priorities.
- Avoid and minimize the footprint of the project in areas of wetland. Ecology has recommended locating facilities such as administration buildings, employee parking, and other nonessential facilities away from wetlands.
- Determine the area of affected wetland. WDFW, Ecology, the Tulalip Indian Tribes, and Lummi Indian Nation have requested the area of affected wetland.
- Ecology has recommended using the “State of Washington Alternative Mitigation Policy Guidance for Aquatic Permitting Requirements” from the Departments of Ecology and Fish and Wildlife and “How Ecology Regulates Wetlands” documents.
- Ecology has recommended that an alternatives analysis be conducted for the cogeneration plant site.
- Ecology has suggested that a U.S. Army Corps of Engineers Section 404 permit may be required for wetland issues.
- If available for use, the upland buffer area along Grandview Road should be considered for the cogeneration plant siting or its exclusion from siting consideration should be justified. Ecology’s Wetlands Section has recommended using upland buffer area along Grandview Road for the plant site.
- If necessary, the preferred compensatory mitigation plan is onsite in-kind, onsite out-of-kind, offsite in-kind, and offsite out-of-kind in that order. Ecology’s Wetlands Section staff has recommended using the above priorities, but they have also acknowledged that the in-kind plant species at the site (reed canarygrass) is a non-native invasive weed, and the site is a very big area in this case.
- If necessary, offsite mitigation should be within the Terrell Creek drainage. Ecology has recommended that mitigation be within the same drainage basin as the wetland impacts.

Vegetation

These recommendations assume that the construction of the cogeneration plant would affect existing vegetation on the site. Issues related to vegetation may include the following:

- Removal of vegetation would be avoided wherever possible.
- Revegetation of disturbed soils with native species would occur immediately after construction and final grading to reduce soil erosion and colonization by non-native species.
- Construction equipment would be kept out of areas of vegetation to preserve habitat, minimize soil compaction, and reduce erosion.

Agricultural Crops

Loss of several acres of agricultural cropland could potentially occur if the area on the northern portion of the site (near Grandview Road) is developed. This area could be considered to be agricultural production (hybrid poplar cultivation).

Electrical Transmission Corridor

Wetlands

Recommendations for wetland impacts along the electrical transmission line corridor would be similar to issues discussed for the cogeneration plant. An existing transmission line has been permitted but not built for BP. No information is currently available about the configuration and alignment of the second transmission line. It is expected that this permitted corridor would be modified for use with the cogeneration plant. Any additional wetland impacts would be assessed as suggested for the plant site. Recommended criteria for wetland impacts, classification, mitigation, and monitoring are identified above in this section.

Vegetation

Because of the relatively small footprints for the power line towers, the vegetation impact could be minimized. Issues related to vegetation may include those identified above in this section.

Agricultural Crops

Loss of some agricultural cropland could potentially occur because of construction activities for the electrical transmission lines related to the towers and access roads.

3.4.2.2 *Operation and Maintenance*

Cogeneration Plant Site

Wetlands

Because no wetlands would occur within the plant site after construction, no operational impacts on wetland resources would occur. If constructed, wetland and wetland buffer impacts could be associated with maintenance of a water supply line. Since this line alignment has not been determined, the impacts, if any, are unknown at present.

Vegetation

Areas of natural vegetation at the plant site would be trimmed as required to avoid interference with the operation of the proposed facilities. To allow for visual inspection, the land around the natural gas pipeline connections would be maintained as grassland. Woody vegetation would be removed by mechanical methods. If areas of natural vegetation were

converted to landscaped areas, these converted areas would require some regular maintenance such as mowing, trimming, and possibly watering.

In addition, stormwater from the cogeneration site is proposed to be conveyed offsite via existing surface water drainages, which could change vegetation on or near the site. These drainages and associated low areas may receive higher water input. Such increased hydrologic conditions could benefit vegetation adapted to wetland conditions. As a result, there could be a gradual expansion of wetland areas on or offsite during the operation of the project. Invasive, non-native, weedy species, including noxious weeds could also become established. Any population of non-native noxious weed may be a significant impact without the implementation of appropriate monitoring and control programs. For example, a small patch of reed canarygrass less than 100 square feet can colonize an entire field in a couple of years. Because most noxious weeds are very difficult to pull out by hand, less desirable chemical removal methods are usually necessary.

Agricultural Crops

The plant site is not currently used for the production of agricultural crops, although hybrid poplars are grown on a portion of the proposed site. Therefore, no operational impacts would occur on cropland.

Electrical Transmission Corridor

Wetlands

Wetland and wetland buffer impacts could be associated with maintenance of the electrical transmission lines.

Wetland vegetation may be affected through the corridor during maintenance activities. To provide for clearance with active electrical conductor cables and to allow for visual inspection, the corridor—to and from the access roadway—would be regularly maintained and kept clear of woody vegetation. Trees and shrubs immediately adjacent to the corridor would require periodic trimming of branches. Herbicides should not be used to control vegetation in wetlands or their buffers.

Converting forested wetlands in the transmission line corridor to a non-forested condition through maintenance would have the effect of changing the functions of the wetlands. Once trees in a wetland are cut, there is usually a change in hydrology due to the lack of evapotranspiration and storage of water in the trees. In addition, wildlife habitat functions are generally decreased with the decreased structural diversity. For these reasons, additional wetland mitigation would be required by Ecology for wetland impacts in this corridor. Partial credit can be obtained by planting low-growing native shrubs and groundcover where trees would be cut.

Vegetation

Operational impacts on vegetation would not be significant. Any impacts would occur in the corridor primarily where the access roads are located. Also, to provide clearance for active electrical conductor cables and to allow for visual inspection, the corridor—to and from the access roadway—would be regularly maintained and kept clear of woody vegetation. Trees

and shrubs immediately adjacent to the corridor may require periodic trimming of branches. For non-wetland vegetation, there would be no significant impacts.

Agricultural Crops

The electrical transmission corridor is not currently used for the production of agricultural crops. Therefore, no operational impacts would occur to active cropland.

3.5 Wildlife

This section identifies and provides a framework for the analysis of wildlife issues associated with the proposed siting of a new cogeneration plant at the BP Cherry Point Refinery in Whatcom County, Washington. Existing conditions, potential issues of proposed construction and operation, and additional information needs for wildlife species that are found within the vicinity of the proposed project are addressed. This section provides the framework for a more detailed analysis of wildlife impacts in the ASC environmental report to follow.

3.5.1 Existing Conditions

3.5.1.1 Cogeneration Plant Site

General Wildlife Species

WDFW's Priority Habitat and Species database (WDFW 2001) indicates that several priority wildlife species or habitats are known to occur in the vicinity of the plant site. Priority species known to occur in the area include bald eagle, blue heron, trumpeter swan, and anadromous fish in Terrell Creek. Priority habitats in the area include riparian and wetland habitats. While they are not priority habitats, WDFW generally has identified old fields as important wildlife habitat. At this site, however, the old fields have reverted to wetlands dominated by non-native species, which are generally not important wildlife habitat. Also, the marine habitats off Cherry Point have been identified as important for spawning herring, migratory salmonids, and macroalgae plant communities.

Known occurrences of priority species include a blue heron colony approximately 1 mile northwest of the site (WDFW 2001a) on land owned by BP east of Birch Bay State Park. Approximately 200 nests have been observed in this colony (SHAPIRO 1994). Blue herons that nest here could forage within and near the cogeneration site, given the density of wetlands associated with Terrell Creek and the former cropland drainage ditches still present on the site. To protect these areas, BP has donated two Conservation Easements (as specified in RCW 84.34.210) of 77 acres and 103.43 acres each to the Whatcom Land Trust (a non-profit corporation). BP continues to pay associated property taxes and upkeep and maintenance costs for this land.

WDFW and Whatcom County have identified the area surrounding Lake Terrell as important overwintering habitat for trumpeter swans (see below). Furthermore, Whatcom County has identified most of the shoreline of Cherry Point, a large area surrounding Birch Bay State Park, and a large portion of the northwestern corner of Whatcom County as Habitat

Conservation Areas. The boundary of the latter Habitat Conservation Area is approximately 1.5 miles from the proposed facility.

Anadromous salmonids are known to use Terrell Creek, including coho, winter steelhead, and sea-run cutthroat trout (WDFW 2001a). According to observations made by BP's consultant, Golder Associates, and by SHAPIRO staff, salmon do not have access to the proposed cogeneration site because there are no streams or defined channels.

Direct wildlife observations at the plant site include a variety of passerine birds and raptors, as well as small mammals. Additional onsite surveys for breeding birds, small mammals, and amphibians would provide more detailed information about the level of wildlife use of the site.

Threatened and Endangered Species

The only threatened or endangered species known to occur in the project vicinity is the bald eagle. The bald eagle is currently federally and state-listed as threatened. Its state status is currently under review, and WDFW has recommended that its status be downgraded to sensitive (WDFW 2001b). A known bald eagle nest territory exists adjacent to Lake Terrell 2.5 miles southeast of the proposed cogeneration site and in Birch Bay State Park 1.5 miles northwest of the site (Whatcom County 2001). WDFW (2001a) reports one sighting of gray wolves near the project area. Two adult gray wolves were heard and seen by reliable observers in 1991. The sighting is categorized as "probable." These wolves may have been escapees from a game farm, released from private control, or were indeed dispersing wild wolves.

Other special status species include the Cherry Point Pacific herring spawning stock (State Sensitive), the trumpeter swan (Priority species), the peregrine falcon (State Endangered), and the common loon (State Sensitive). The trumpeter swan, peregrine falcon, and the common loon have been observed using habitats in and around Lake Terrell (WDFW 2001a). The trumpeter swan makes routine migratory stopovers in northwestern Washington, particularly in the fallow agricultural fields of the Skagit Valley. The proposed cogeneration site has some old fields, but it has been many years since the fields were used. They are dominated by weedy and wetland grass species now. Lake Terrell and the ponds northwest of the cogeneration site are likely resting and foraging habitats for swans and many other species of waterfowl, including snow geese, mallards, common merganser, wood duck, bufflehead, and Barrow's goldeneye.

3.5.1.2 Transmission Lines

General Wildlife Species

As described above, the WDFW Priority Habitat and Species database (WDFW 2001a) indicates that several priority wildlife species or habitats are known to occur in the proposed plant vicinity. The transmission lines would pass through mixed conifer and hardwood forest east of the cogeneration site to connect with the existing BPA 230-kV line that runs north to south just west of Terrell Creek. This mixed second-growth forest is composed of hardwoods such as red alder, black cottonwood, and big-leaf maple. Typical conifer species include western red cedar, western hemlock, and Douglas fir. Forested wetlands are scattered throughout this area. Many different wildlife species likely use this forested area for some

portion of their life cycle. Typical species of interest may include black-tailed deer, coyote, red-tailed hawk, pileated woodpecker, and red-legged frog.

Threatened and Endangered Species

No other federally listed threatened or endangered wildlife species are expected to occur within the proposed transmission line routes other than those listed for the cogeneration plant site.

3.5.2 Environmental Issues of the Proposed Project

3.5.2.1 Construction

This section discusses environmental issues associated with construction of the proposed cogeneration facility, including natural gas pipeline connections. These issues include those raised by local, state, and tribal agencies (particularly WDFW). Impacts during construction would involve direct and indirect disturbance to species through habitat removal and noise disturbance caused by heavy equipment, vehicles, and crew activity. These disturbances would include digging, filling, grading, trenching, vegetation clearing, and compacting vegetation and soils.

General Wildlife Species

The cogeneration facility would affect approximately 25 acres of vegetation. Vegetation in the vicinity of the site includes old fields, wetlands, upland scrub forest, and upland conifer forest. Depending on the final siting of the facility, different amounts of these habitats would be permanently removed through clearing and cut-and-fill activities. Within this area of disturbance, wildlife species—predominately birds and small mammals—would be displaced, and the value of the remaining habitat for general wildlife species would be decreased. Noise and construction activity also would potentially disturb wildlife species using habitat adjacent to the proposed plant site. The extent of these impacts would be more easily assessed after additional surveys. These impacts should then be quantified in the ASC environmental report. That analysis should address the following questions posed by WDFW:

- How much wetland, riparian forest, and old field habitats would be affected by the proposed cogeneration plant?
- How much wildlife habitat would be directly affected, and would some of this habitat loss negatively affect fish and wildlife?
- Would the construction of the proposed cogeneration plant protect priority habitats and species?
- What types of construction methods and timing are proposed?

Temporary disturbance to and displacement of wildlife species would result during the installation of the transmission line. Impacts could include temporary displacement from the construction corridor and adjacent areas due to both construction activity and temporary habitat alteration. Noise and activity associated with construction would also potentially disturb wildlife species using adjacent habitat. Other potential issues associated with construction that need to be considered include the following:

- Increased human activity
- Additional impacts of access roads and construction staging areas

Threatened and Endangered Species

Construction of the proposed project would not affect any bald eagle perching, roosting, or nesting habitat. Indirect effects to the prey of bald eagles (e.g., waterfowl) would need to be addressed. Although there has been a gray wolf sighting in the area (WDFW 2001a), the project area is highly unsuitable for wolves, mainly because of the high level of human activity, presence of industrial land uses, chain-link fencing, and lack of suitable prey base.

3.5.2.2 *Operation and Maintenance*

Cogeneration Plant Site

Operation of the new cogeneration plant, including natural gas pipeline connections, would permanently reduce foraging habitat for a variety of species. Breeding habitat for some small mammals and local songbirds would be lost. Increased noise from the facility would likely cause wildlife to avoid the area until they became acclimated to the new ambient noise level. The ASC environmental report should quantify the potential increase in noise levels, as well as the potential increase in water usage and stormwater.

Transmission Lines

Maintenance of the transmission lines would involve vegetation removal on a regular, long-term basis. Depending on the frequency of maintenance, a variety of wildlife species may be temporarily disturbed. Maintenance of the access road would involve minor disturbances to roadside vegetation and water quality. Presence of one or two large tower transmission lines could create more collision hazards for shorebirds and waterfowl. These impacts would need further analysis in the ASC environmental report.

3.5.3 *Additional Information Needs*

Several additional data needs have been identified and are recommended prior to completing the ASC environmental report:

- Conduct surveys for breeding birds, small mammals, and amphibians. These surveys should be done in the spring of 2002 and can be submitted to EFSEC as follow-up information.
- Obtain species lists from state and federal agencies (WDFW, USFWS, and NMFS).
- Determine importance of gray wolf sighting.
- Quantify acreage impacts by habitat type once final siting is accomplished.

3.6 *Fisheries*

This section identifies and provides a framework for the analysis of fisheries issues associated with the proposed siting of a new cogeneration plant at the BP Cherry Point Refinery in Whatcom County, Washington.

3.6.1 Existing Conditions

3.6.1.1 Cogeneration Plant Site

A number of fish species are likely found in the general project area (see Table 2-4). The proposed cogeneration site is crossed by several ditches that carry water seasonally to natural drainages leading to Terrell Creek. Terrell Creek supports winter steelhead, coho, and resident and sea-run cutthroat trout spawning populations (WDFW 2001a). These and other salmonid species, including the federally threatened chinook, are known to use the nearshore areas off Cherry Point for migration and rearing (Whatcom County 1996). Other resident fish include sculpins and arctic char. According to Golder Associates and SHAPIRO staff who visited the site, there is no surface water connection between water on the proposed cogeneration facility site and Terrell Creek. Thus, there is no fish access to the site.

Table 2-4. Special-Status Fish Species Likely to Occur in the Project Vicinity

Species	Status	Key Habitats of Concern	Key Habitat Present in Project Vicinity
Chinook, fall-, spring-, summer-run (<i>Oncorhynchus tshawytscha</i>)	Federal Threatened, State Candidate	Rivers/streams where known to spawn, associated riparian and estuarine waters	Known to spawn in larger river systems, including Nooksack. Marine waters off Cherry Point likely to be used by migratory juvenile salmon.
Cutthroat trout, sea-run (<i>Oncorhynchus clarki</i>)	Federal Threatened	Rivers/streams where present, associated riparian areas and contributing waters	Known to spawn in Terrell Creek.
Coho salmon (<i>Oncorhynchus kisutch</i>)	Federal Candidate	Rivers/streams where present, associated riparian areas and estuarine rearing environment	Known to spawn in Terrell Creek.
Pacific herring (Cherry Pt. Stock) (<i>Clupea harengus pallasi</i>)	State Candidate	Eelgrass and marine algae beds between 0 and -10 tidal elevation	Spawning stock in Cherry Point vicinity is largest in state.
Surf smelt (<i>Hypomesus pretiosus</i>)	State Forage Fish	Upper intertidal gravel beaches	Known spawning beach north of Cherry Point.
Bull trout (<i>Salvelinus confluentus</i>)	Federal Threatened, State Candidate	Rivers/streams where present, associated riparian areas and contributing waters	Potentially spawn in Terrell Creek.

What used to be Washington State's largest herring spawning stock is located in the vicinity of Cherry Point (Lemberg et al. 1997). This stock is unique in Washington State because of its late spawning time, ending in mid-June, while most other stocks cease spawning in April. In 1973, this stock reached a record high recruitment level of 14,998 short tons (Stick 1999). Since 1999, however, the spawning escapement has dropped to a low of about 1,000 tons. No other spawning stock has shown such a dramatic decline. While the causes are not certain, evidence points to increased predation and temperature fluctuations in marine waters. Female Pacific herring deposit 10,000 to 30,000 transparent, adhesive eggs primarily on eelgrass and marine algae in the intertidal and subtidal zones generally from 0 to -10 feet tidal elevation. There is also a documented surf smelt spawning beach on the north side of Cherry Point (WDFW 2001a).

3.6.1.2 *Transmission Lines*

The proposed route for the 230-kV transmission lines intersects the existing BPA 230-kV transmission line west of Terrell Creek. Wetlands occur adjacent to the proposed line route, but the line would not cross the creek. Fish habitat does not occur along the route.

3.6.1.3 *Water Pipeline*

Although a new cooling water supply pipeline would not be needed assuming air-cooling technology would be used as currently proposed, BP may decide to build a new pipeline for using treated wastewater from one of several sources for process water. The proposed alignment of this pipeline is not known at this time; consequently, the potential for impacts to fisheries is not known.

3.6.2 *Environmental Issues of the Proposed Project*

3.6.2.1 *Construction*

Cogeneration Plant Site

This section discusses environmental issues associated with construction of the proposed cogeneration facility. These issues include those raised by local, state, and tribal agencies (particularly WDFW, Ecology, Lummi Indian Nation, Nooksack Indian Tribe, and Washington State Parks and Recreation Commission). Construction of the cogeneration facility may create sediment input to Terrell Creek through increased stormwater outfalls into the mitigation wetland, which is located northwest of the site. Evaluating construction impacts would depend on proposed best management practices (BMPs) and other erosion control techniques. Issues that would need to be addressed in the ASC environmental report include the following:

- What types of construction methods and timing are proposed, and do any of the methods address the habitat or life stage requirements of priority fish species?
- What are the potential impacts on local fisheries, considering fish migrate past Cherry Point on the way to the Nooksack River (already temperature impaired and on the Section 303(d) list) and considering that Terrell Creek has water quality problems and supports coho (Dorimus 2001)?
- What types of erosion control are proposed during construction?

Transmission Lines

Construction of the transmission lines may have water quality impacts on Terrell Creek, but would not likely have direct effects on fish. Indirect effects need to be addressed in the ASC environmental report.

3.6.2.2 *Operation and Maintenance*

Cogeneration Plant Site

The design, maintenance, and monitoring of the wetland mitigation areas, which receive stormwater runoff from the cogeneration facility site, would contribute to the effects of site operation and maintenance on water quality in Terrell Creek. These potential impacts would need to be addressed in the ASC environmental report.

Operation of the cogeneration facility (discharge of blowdown water) could affect contaminant concentrations and the temperature of wastewater that is currently discharged into marine waters off Cherry Point. The volume of total refinery wastewater may be increased by the addition of blowdown water from the proposed cogeneration plant. This could have effects on marine fish, including spawning herring and migrating juvenile salmon. This issue was raised by numerous commentors, including the City of Blaine, WDFW, and the tribes). The outfall is at the end of the existing BP (ARCO) pier, approximately 2,000 feet from shore and at a depth of approximately 65 feet. This location puts the outfall beyond the primary intertidal and subtidal spawning zone of herring. Potential changes in water sources for the refinery and proposed cogeneration plant need to be coordinated with proposed stormwater control facilities and methods. These potential impacts and project changes would need to be addressed in the ASC environmental report.

No other features of plant operation should affect fisheries.

Transmission Lines

Maintenance and use of the access roads associated with the transmission lines could have indirect effects on fish through effects on water quality from runoff.

3.6.3 *Additional Information Needs*

The recommended additional data needs discussed above in the wildlife section would also aid in assessing project impacts on fish. In addition, obtaining any and all fish survey information for Terrell Creek as well as obtaining official species lists from state and federal agencies (WDFW and NMFS) would aid the accuracy of the environmental assessment.

3.7 *Energy and Natural Resources*

The BP Cherry Point Cogeneration Project would consume energy and natural resources directly and indirectly during both construction and operation. Direct consumption involves the use of natural gas as fuel for generating electricity during project operation. Indirect consumption refers to energy expended by vehicles and equipment in the construction, maintenance, and daily operation of the facility.

3.7.1 Existing Conditions

3.7.1.1 Energy Sources

Electricity, natural gas, and petroleum fuels are readily available in the project area. Electric energy sources in Whatcom County include electricity provided by Puget Sound Energy, BPA, and by BP-owned electrical generating units (fourteen 5.5-mW Solar Taurus gas-fired turbines, simple-cycle). Power to the refinery site has been provided by Puget Sound Energy through two 115-kV transmission lines that are routed along roadway easements, such as Grandview Road (although most electric power for the refinery is currently being generated by the solar gas turbines). Two major power generating stations in the immediate area include the Whitehorn Power Generation Plant (owned by Puget Sound Energy) and the 249-mW gas turbine facility located at the nearby Tosco refinery.

Two existing 500-kV BPA transmission lines traverse the county from the north at the Canadian border to the south at the Skagit County boundary. At Custer, there is a major substation on these BPA lines from which two 230-kV transmission lines originate. These lines are routed west and then south to the substation at the Alcoa Intalco aluminum smelter.

The Williams Company operates the existing 36-inch natural gas pipeline that runs through central Whatcom County, which supplies natural gas from fields in Alberta, Canada. The existing BP-owned pipeline connects with the Westcoast pipeline in the vicinity of Sumas near the Canada-U.S. border.

In addition, a second natural gas pipeline runs adjacent to the BP-owned pipeline along Grandview Road. This pipeline historically provided natural gas to the refinery before the BP-owned pipeline was constructed. This pipeline, operated by Cascade Natural Gas, currently supplies natural gas to the Puget Sound Energy Whitehorn Power Generation Plant west of the BP refinery.

A proposed third pipeline intended to cross the Strait of Georgia (the Georgia Strait Crossing or GSX Pipeline) is also being considered for use in supplying natural gas to the refinery. This pipeline is a joint venture by Williams Companies and B.C. Hydro. The pipeline is proposed in response to growth in natural gas demand and is projected to be completed in 2004.

Diesel fuel, gasoline, and other petroleum products are produced by the BP and Tosco refineries in Whatcom County and distributed through various bulk dealers and service stations. A petroleum pipeline operated by Olympic Pipe Line Company originates at the refineries in Whatcom County and moves refined products to markets in the Seattle area.

3.7.1.2 Nonrenewable Resources

Nonrenewable resources include gravel and other fill materials that are used to maintain existing roads and rights-of-way. Petroleum products are used for trucking, farming, commuting, and boating in the area. Petroleum coke produced by the BP refinery, a byproduct of the refining process, is sold overseas and to the Alcoa Intalco aluminum smelter in Whatcom County to make anodes for smelting pots.

3.7.1.3 Conservation and Renewable Resources

BP performs energy audits at the refinery on a continual basis and, as warranted by project economics, makes process improvements intended to reduce and conserve energy.

Conservation of water and electricity may take place on an individual basis in Ferndale, Birch Bay, Blaine, and other communities in the general area through such methods as the use of insulation, energy-efficient lighting, and low-flow water fixtures.

3.7.2 Environmental Issues of the Proposed Project

3.7.2.1 Construction

Energy Sources and Consumption

The BP Cherry Point Cogeneration Project would be constructed using steel, glass, concrete, asphalt, and other materials that require energy for fabrication and transport. Cranes, trucks, earth-moving equipment, tools, and other equipment operated during construction would consume additional energy. Data for anticipated energy use during construction are unavailable since engineering has not been completed; however, consumption levels would likely not be significant over the two-year construction period.

Energy would predominately be consumed in the form of electricity, gasoline, diesel fuel, and oil. It is expected that electricity for construction would be supplied by the combination of BP-owned generation units and Puget Sound Energy supplied through the existing 115-kV lines serving the refinery. During non-working hours, electricity use would primarily consist of lighting for security purposes. In the unlikely event that electricity is not available (such as during power outages), power could be made available through the use of self-contained construction equipment such as engine-driven welders and portable gas/diesel electric generators.

Diesel, gasoline, oil, and electricity would be used for transporting construction materials and the workforce to the site; for operating and maintaining construction equipment; for installing the natural gas pipeline connections, water pipelines, steam pipelines, emergency fuel pipelines, and transmission lines; and for construction of the generation plant and support facilities. The amount of energy that would be used is anticipated to be typical for a construction project of this size.

Other Nonrenewable Resources

Bulk construction materials such as soil, aggregate gravel, and sand are expected to be supplied from local quarries (not specified at this time). Other building materials and construction equipment would likely be purchased from equipment material suppliers. The project is not anticipated to have a significant impact on the available non-energy natural resources in Whatcom County.

Conservation and Renewable Resources

Best management practices should be used to minimize waste and spillage of fuels and oil during construction.

3.7.2.2 *Operation and Maintenance*

Energy Sources and Consumption

Natural Gas

The BP Cherry Point Cogeneration Project would be a natural gas-fired, cogeneration facility, the purpose of which would be to generate process steam and electricity for the petroleum refinery and electricity for sales through the BPA transmission line grid. In this electrical generation process, natural gas is burned to fuel a gas turbine engine that drives a generator to produce electrical energy.

Two pipelines would supply natural gas to the proposed BP cogeneration plant. One pipeline is the existing BP-owned pipeline that currently provides natural gas to the refinery. This pipeline would continue to operate at existing operating pressures and would not require the construction of new compressor stations. Additional supplies of natural gas would be supplied by one of two alternate natural gas pipelines. One existing pipeline, owned by Cascade Natural Gas Company, previously supplied natural gas to the refinery. Currently, this pipeline supplies natural gas to the Puget Sound Energy Whitehorn Power Plant located on the west side of the refinery (this power plant is a peaking unit which only operates as needed to meet high electric energy demands). Supplies of natural gas delivered via this pipeline would be provided by a third-party supplier. Interconnection to this pipeline is proposed in the same general vicinity as the interconnection to the BP-owned pipeline. The other alternate pipeline being considered is the GSX pipeline proposed for the Strait of Georgia, a joint venture sponsored by Williams Companies and B.C. Hydro. This pipeline would be routed near the refinery (potentially on BP property) and could be available by the time the BP cogeneration project would be permitted and constructed.

The specific quantities of natural gas required to operate the proposed BP cogeneration plant is unknown at this time. The existing BP pipeline can deliver approximately 110 million cubic feet of natural gas per day to the refinery, and additional natural gas would be provided through the selected alternate pipeline. BP indicates that most natural gas purchased by the company is from Canada.

Shutting down three of BP's four existing package boilers at the refinery would partially offset the amount of natural gas needed.

Although the existing gas supply appears to be sufficient to fuel the proposed project, it is not clear what the cumulative impact of other proposed and possible projects would be on the supply available to the state of Washington.

Electricity

Although the BP Cherry Point Cogeneration Project would normally be self-powering, the refinery could also draw electricity from the interconnection with the BPA 230-kV transmission line east of the project site, if needed in the unlikely event that the cogeneration plant is completely down. The existing 230-kV transmission line receives its power from the BPA grid, connected at the Custer Substation. Power demands from the BPA 230-kV line are not expected to be high and would not have a significant impact on the BPA grid system.

Electricity generated from the project in excess of that required by the BP refinery (approximately 635 mW) would be sold on a commercial basis (that is, electricity from the project could be sold to any customer) or through power purchase contracts. Electricity generated by the project would be transmitted to the power grid directly through the existing overhead 230-kV power line owned by BPA and through two new BPA-owned 1-mile-long 230-kV transmission lines extending from the substation at the project site to the interconnection location to the BPA 230-kV transmission line east of the cogeneration plant. As a result, electrical energy from the project would be available to customers on the BPA power grid and future customers who connect to the grid.

The project would provide additional baseload capacity (rather than peaking) electrical energy to the western United States transmission grid. BP has committed to providing a portion of the electric power generated by this facility at market-advantaged prices to Whatcom County and Washington customers.

Other Nonrenewable Resources

Minor amounts of additional fossil fuels, used for trucks and construction equipment, would be consumed for maintenance of the plant, transmission line, and any new water pipeline.

Conservation and Renewable Resources

Water

The project would use up to 500,000 gpd for new makeup water in the production of steam. This amount of water needed would be in addition to water already used by the BP refinery, which directly consumes water (in the form of steam) as a process input to various operating units. The consumed water would not return to the HRSGs to make new steam and thus must be made up from fresh supplies.

The project as proposed would use air-cooled condensers, which do not require water. BP has an existing contract with Whatcom County PUD No. 1 to provide up to 11 million gpd of freshwater from the Nooksack River, but currently uses only an average of 6.5 million gpd.

Energy Efficiency

A cogeneration plant has higher thermal efficiency than either combustion turbines in simple-cycle or combined-cycle configuration, or any other standalone power plant. As such, energy would be produced in a manner that is overall more efficient than most other forms of thermal power production. The combined-cycle technology is currently considered the most advanced power generation technology available for natural gas-fired plants and is used or proposed for use by most power generation facilities using natural gas.

In addition, higher energy conversion efficiencies also result in less air pollutant generation and lower water use per unit of electricity (and steam) produced.

3.8 Noise

3.8.1 Introduction

This section provides a general description of existing sound level (noise) conditions at the proposed BP cogeneration facility site, which includes the power plant and transmission lines from the proposed facility to the existing BPA lines. This section also discusses regulatory concerns and regulatory agency project issues related to noise.

The design of the cogeneration plant and the distance from the proposed facility to the closest noise sensitive receptors indicates that the probability of noise impacts (as defined by regulation) at adjacent properties is small. Potential noise impacts perceived by the public are demonstrated in the comments from Chapter I of the PSS report. The purpose of this section is to address issues related to noise that could be generated by the proposed project and demonstrate to the community and responsible agencies that this project would not likely pose a degradation of the environment from the standpoint of noise.

3.8.2 The Nature of Noise

Sound travels through the air as compression waves (air pressure fluctuations) caused by a source of vibration. Because energy contained in a sound wave is spread over an increasing area as it propagates away from the source, perceived loudness decreases with distance.

The physics of the propagation, perception, and measurement of sound is anything but intuitive, however. Readers without a technical background may not understand some of the subtle issues involved with assessing noise impacts. Issues that make understanding noise a challenge include:

- the logarithmic aspect of the A-weighted decibel (dBA) measurement scale,
- A-weighting and C-weighting of monitored sound level values (which are different ways of averaging sound levels over time),
- how changes in sound levels and background noise levels are perceived differently by persons with average hearing,
- sound level descriptors such as L_{eq} , L_{max} , and L_{dn} and their application,
- attenuation factors: distance, natural and man-made obstructions, and meteorological effects.

Sound is measured in decibels. Because the human ear does not respond equally to all sound frequencies, an “A-weighted” scale (the dBA scale) is generally used to assess the effects of noise on people. A-weighted sound level measurements reduce the measured sound pressure level for low-frequency sounds while slightly increasing the measured pressure level for some high-frequency sounds. All sound levels discussed in this section are provided in dBA.

People generally perceive a 10-dBA increase in a noise source as a doubling of loudness. For example, a 70-dBA sound level would be perceived by an average person as twice as loud as a 60-dBA sound. People cannot generally detect differences of 1 dBA between noise sources; a difference of 3 dBA is usually the smallest perceptible change in sound level. Table 2-5 shows some common noise sources and the sound levels they produce.

The dBA scale is logarithmic. Therefore, individual dBA values for different sources cannot be added directly to give the sound level for a combined source. For example, two sources, each producing 50 dBA, would, when added logarithmically, produce a combined noise level of

53 dBA. Federal regulatory agencies often use the “equivalent sound level” (known as the L_{eq}) to evaluate noise impacts. The L_{eq} , which is roughly equivalent to the average sound level, is the level of a constant sound with the same sound energy as the actual fluctuating sound.

Table 2-5. Weighted Sound Levels and Human Response

Sound Source	dBA ^a	Response Criteria
Carrier deck jet operation	140	Limit amplified speech
Limit of amplified speech	130	Painfully loud
Jet takeoff (200 feet) Auto horn (3 feet)	120	Threshold of feeling and pain
Riveting machine Jet takeoff (2,000 feet)	110	
Shout (0.5-foot) New York subway station	100	Very annoying
Heavy truck (50 feet) Pneumatic drill (50 feet)	90	Hearing damage (8-hour exposure)
Passenger train (100 feet) Helicopter (in-flight, 500 feet) Freight train (50 feet)	80	Annoying
Freeway traffic (50 feet)	70	Intrusive
Air conditioning unit (20 feet) Light auto traffic (50 feet)	60	
Normal speech (15 feet)	50	Quiet
Living room Bedroom Library	40	
Soft whisper (15 feet)	30	Very quiet
Broadcasting studio	20	
	10	Just audible
	0	Threshold of hearing
(a) Typical A-weighted sound levels taken with a sound-level meter and expressed as decibels on the scale. The “A” scale approximates the frequency response of the human ear. Source: U.S. Council on Environmental Quality 1970.		

For a given noise source, factors affecting the noise impact at a receiver include the distance from the noise source, the frequency of the sound, the acoustical absorbency of the intervening terrain, the presence or absence of obstructions, and the duration of the noise event. The degree of impact also depends on who is listening, existing sound levels, and when the noise event takes place.

When distance is the only factor considered, sound levels from isolated point sources typically decrease by about 6 dB for every doubling of distance from the noise source, beginning at a point from the source approximately three times the largest dimension of that source. For example, if the largest dimension of the noise source is 120 feet and it produces a sound level of 60 dB, then beginning from a point approximately 360 feet from the source, the sound level would attenuate at a rate of 6 dB per doubling of distance. At a distance of 720 feet from the source, the noise level would be 54 dB, and at 1,440 feet the noise source would be 48 dB.

Noise levels at different distances can also be affected by a number of factors other than distance from the noise source. Topographic features and structural barriers that absorb,

reflect, or scatter sound waves can result in increased or decreased noise levels. Atmospheric conditions (e.g., wind speed and direction, humidity level, and temperature) can also affect the degree to which sound is attenuated over distance. Noise reflections off topographical features or buildings can sometimes result in higher sound levels (i.e., lower sound attenuation rates) than normally expected. Temperature inversions and changes in wind conditions can at times refract sound waves to locations at considerable distance from the noise source. However, focusing effects are usually noticeable only for intense noise sources, such as blasting operations.

3.8.3 Noise Standards

Noise ordinances and regulations from all jurisdictions relevant to the construction and operation of the project should be presented, and potential limitations on the project resulting from regulation should be discussed. Special consideration should be given to the regulatory aspects of monotonic, harmonic, and low-frequency noise. Since the plant is to be operated 24 hours per day, nighttime noise limits imposed by regulations should be addressed.

3.8.4 Existing Conditions

Existing noise sources and levels from the refinery process units would need to be described and quantified. Noise-related natural features such as topography and vegetation, and man-made features such as roadways, railways, and other industrial installations (wood treatment facility and Puget Sound Energy generating plant for example), would need to be described as well. Land use of adjacent properties and its regulatory consequences should be explained. The proximity of residential communities, the Birch Bay Bible Community Church, the Birch Bay State Park, and the Lake Terrell Wildlife Area should be shown with a map.

3.8.5 Environmental Issues of the Proposed Project

Based upon review of the project information received from BP, meetings with agencies, Indian tribes, and non-governmental organizations, and from comments received from the interested public both in writing and from the public meeting, a number of noise issues have been identified. This section describes these issues and their relevance to the BP Cherry Point Cogeneration Project.

3.8.5.1 Construction

Construction noise is exempt from state and county noise limitations, except during the hours from 10:00 p.m. to 7:00 a.m. on weekdays, and from 10:00 p.m. to 9:00 a.m. on weekends. Construction industry best practices for noise control should be presented and explained. Table 2-6 presents typical noise levels from construction equipment. This equipment could potentially be used at all construction sites for the project.

Additional traffic noise would be generated along the access roads near each site by construction workers and trucks bringing building materials to construction areas.

Table 2-6. Typical Construction Equipment Noise Levels

Type of Equipment	Noise Level in dBA at 50 Feet
Bulldozer	80
Front Loader	72 – 84
Jack Hammer or Rock Drill	81 – 98
Crane with Headache Ball	75 – 87
Backhoe	72 – 93
Scraper and Grader	80 – 93
Electrical Generator	71 – 82
Concrete Pump	81 – 83
Concrete Vibrator	76
Concrete and Dump Trucks	83 – 90
Air Compressor	74 – 87
Pile Drivers (Peaks)	95 – 106
Pneumatic Tools	81 – 98
Roller (Compactor)	73 – 75
Saws	73 – 82
Source: EPA “Noise from Construction Equipment and Operations”	

3.8.5.2 *Operation and Maintenance*

Graphs of existing operational noise sources should be presented and compared with predicted future noise levels. Noise impacts should be identified.

For the similar-sized project proposed at Sumas, Washington, the noise impact analysis demonstrated that noise resulting from the proposed project would comply with residential noise limits within approximately 3,000 feet of the project site. Due to the distance to the nearest residential receivers for the BP Cherry Point Cogeneration Project (approximately 1 mile) and the remoteness of the project area, noise from the proposed facility at the proposed site would not likely exceed residential noise limits established by regulation. At Birch Bay State Park, noise from the proposed project could be discernible against the relatively quiet background noise environment, but it is unlikely that noise levels would exceed the residential standard. BP should provide more quantitative analyses of sound levels generated and received during operation, however, including low-frequency noise, in its ASC environmental report.

3.8.5.3 *Noise Study Methods*

Field measurements of existing noise sources should be compared with predicted future noise levels taken from models. The models should include existing and proposed industrial noise sources at the project site and noise sensitive receptors, mostly residential, at adjacent properties. Typical noise levels from the project components should be taken from engineering data provided by the manufacturers.

Existing and future traffic volumes should be obtained, and a traffic noise model, preferably using the Federal Highway Administration (FHWA) Traffic Noise Model v.1.1 (or later) should be generated. A quantitative traffic noise study should be included in this section.

Existing and future noise levels should be checked for compliance with applicable regulations to determine whether the project would create new noise impacts at adjacent properties. Procedures for noise measurement and prediction should be described in accurate but non-technical terms in the Methods section of the ASC environmental report.

Community concerns regarding low-frequency and “resonance” noise should be assessed qualitatively. It should be noted that no existing regulation considers these noise issues.

3.9 Land Use

To date, BP has extended significant effort to document the existing land use compatibility, zoning, and comprehensive plan designations for the existing BP Cherry Point Refinery and the proposed site for the cogeneration plant. Land use issues must be evaluated by EFSEC and BP has wanted to demonstrate the compatibility of the proposed project with surrounding land uses. This documentation is summarized below and is followed by additional land use concerns raised in the public involvement process associated with the preparation of this Potential Site Study. This information will serve as a guide to the development of future environmental documentation for the proposed project.

3.9.1 Existing Conditions

The proposed cogeneration plant is proposed to be located just east of the existing BP Cherry Point Refinery, within the existing property boundaries of the refinery (see Figure 1). The land is zoned Heavy Impact Industrial and Light Industrial. Figures 2 and 3 are the land use zoning maps from the Whatcom County Comprehensive Plan for the Cherry Point Subarea and western Whatcom County, respectively. The site is entirely contained within the Cherry Point Major Industrial Urban Growth Area/Port Industrial, as defined in the Whatcom County Comprehensive Land Use Plan (Whatcom County 2001). This designated area comprises approximately 6,500 acres, of which approximately 2,500 acres is currently used for heavy impact industry.

A food-grade liquid carbon dioxide production plant also is located on BP property, south of the proposed cogeneration plant site. Land to the south of the BP property is zoned Heavy Impact Industrial for about 4 miles, extending to the Strait of Georgia and Slater Road. Land uses include the Alcoa Intalco Works’ primary aluminum smelter and refinery and the TOSCO oil refinery. Just over 4 miles to the south is the Lummi Indian Nation Reservation.

Land to the east of the BP property is zoned Heavy Impact Industrial for about 0.25 miles and Rural for an additional 2 miles to Olsen Road. The boundary of the City of Ferndale Urban Reserve also follows Olsen Road and includes lands further east. In this area, BP land ownership extends to a portion of a BPA transmission corridor. In addition, there is a Chemco wood treatment plant. Land uses within the Rural Zone between the BP property and the City of Ferndale generally include agriculture and livestock farming. The City of Ferndale is approximately 4 miles from the nearest BP property boundary.

Land to the southeast is zoned Parks/Recreation and Rural. Lake Terrell is about 1 mile from the BP property and is within the Parks/Recreation Zone. This lake is a publicly managed wildlife refuge, which is also used for public recreation. Agriculture and livestock farming extend for an additional 2 miles.

Land to the west of the BP property is zoned Heavy Impact Industrial for over a mile. The Puget Sound Energy Whitehorn Power Generation Plant (a simple-cycle combustion turbine plant used for periods of peak electric energy demand) is adjacent to a portion of the BP property. The remainder of the industrial-zoned land is used for agricultural and livestock farming. Land further to the west and northwest includes Point Whitehorn and the Birch Bay State Park. Point Whitehorn is a residential and resort area defined as an Urban Growth Area in the Whatcom County Comprehensive Plan. Birch Bay State Park extends along the shoreline of the Strait of Georgia, which supports recreation, navigation, and commercial fishing industries.

Land to the north of the BP property is zoned Rural and Residential-Rural. Land uses include residential, agriculture, and livestock farming. The Birch Bay Township and the City of Blaine are approximately 1 mile and 6 miles, respectively, north of the BP property. Both communities are identified as Urban Growth Areas in the Whatcom County Comprehensive Plan. Birch Bay has historically been a second home resort area, but increasingly has attracted permanent residents and retirees.

3.9.2 *Environmental Issues of the Proposed Project*

3.9.2.1 *Cogeneration Plant Site*

As described above, the proposed 25-acre site for the cogeneration plant would be constructed on land zoned for Heavy Impact Industrial, and located within the Cherry Point Major Industrial Urban Growth Area (see Figures 2 and 3). The north edge of the project site is a minimum of 370 feet from the nearest BP property boundary. The remainder of the project site is surrounded by at least 0.75 miles of industrial-zoned land. The proposed land use, a cogeneration plant, would be consistent with these land use designations and would be compatible with the adjacent BP refinery.

Consistency with local sensitive areas ordinances and the state Coastal Zone Management Act should also be assessed for all proposed plant site facilities.

3.9.2.2 *Electrical Transmission Lines*

The siting of the electrical transmission lines, electric substation, and natural gas meter stations is currently proposed to be located on BP property and would similarly be compatible with surrounding land uses, the Whatcom County zoning ordinance, and comprehensive plan land use designations. The locations of these facilities and land use designations, however, should be specifically described in future environmental documentation prepared on the proposed project. This documentation is especially warranted because existing Whatcom County zoning regulations restrict the routing of new electrical transmission lines and recent citizen initiatives proposed the adoption of more restrictive regulations governing the construction of transmission lines in the county.

3.9.2.3 *Gas and Water Pipelines*

No siting or routing information is currently available concerning possible alignments for a water supply pipeline. Any proposed alignment for such a facility (off BP property) should consider local government (city or county) zoning and comprehensive plan land use

designations to assure land use consistency and compatibility. In addition, care should be taken to site the water supply pipeline adjacent to compatible existing and likely future land uses.

No new natural gas pipelines are expected to be constructed by BP. There would be new short sections of pipeline needed from the existing BP-owned and the selected third party-owned pipelines that are adjacent to the project site to connect to the fueling area of the cogeneration plant. These sections of pipeline are not expected to be longer than several hundred feet in total length and would be entirely on BP-owned property. New pipelines need to be constructed and operated in accordance with federal and state pipeline safety regulations (49 CFR part 192 and WAC 480-93).

3.9.3 Operation and Maintenance

Once the cogeneration plant and its associated utility facilities are constructed, additional operation or maintenance impacts on land use would be unlikely. Land use regulations, primarily zoning ordinances and comprehensive plans, are designed to minimize both construction and operation impacts on land uses.

Two issues were raised by agencies and the public during the public involvement process associated with the preparation of this PSS, however, that addressed additional land use concerns. The first related to the potential for growth-inducing impacts to occur. People were concerned that the creation of new jobs in the community, based on new permanent hires at the proposed cogeneration plant or its associated facilities could stimulate housing development in the community. As stated earlier, BP estimates that approximately 35 new jobs would be created for the operation of the cogeneration plant (see Section 3.11, Population, Housing, and Economics). The number of new hires that would likely move from outside of the region to take jobs at the cogeneration plant would most likely be extremely small in comparison the existing housing stock available in the region. As such, it would not be likely that the operation of the cogeneration plant would result in growth-inducing impacts. A statement addressing these issues, however, should be included in future environmental documentation on the proposed project.

The second concern addressed potential impacts on existing and likely future land uses to either side of the current alignment of the two natural gas pipelines. As stated earlier, BP has proposed using their existing natural gas pipeline to deliver most of the needed supplies for the proposed cogeneration plant. This conceptual plan assumes that the operating pressure of the existing pipeline would not be increased to meet flow demands by constructing any new compressor stations. Also, additional natural gas needs to meet plant fueling requirements would be met using a second pipeline (either the existing Cascade Natural Gas Company pipeline currently located near the BP-owned pipeline, or the proposed Georgia Strait Crossing Pipeline Project). As such, neither a new pipeline nor new pipeline compressor station would need to be constructed specifically for the BP Cherry Point Cogeneration Project.

The Washington Utilities and Transportation Commission, in particular, has expressed concerns with the natural gas delivery system for the proposed project. The agency is concerned about the existing and potential future proximity of residences to the existing alignment of the natural gas pipeline connections. If needed (the current BP proposal does not include raising pipeline pressures above existing allowable levels), approval to increase the operating pressure of the pipeline should be consistent with 49 CFR Part 192 as adopted by Washington and WAC 480.93.020, which address these potential land use impacts. These

regulations recognize the potential risks to people, buildings, and property adjacent to natural gas pipelines, especially in areas of high population density and economic importance (areas of “high consequence”). In addition, agency representatives asked about proposed pre-operation tests and plans for “integrity management,” as called for in proposed federal regulations. Discussion of these land use issues should be included in future environmental documentation concerning the proposed BP Cherry Point Cogeneration Project.

3.10 Visual Resources, Light and Glare

This section evaluates the potential for aesthetic (visual) impacts of the proposed project. Potential visual impacts include temporary visual changes introduced by construction, operation, and maintenance of the BP Cherry Point Cogeneration Project and permanent visual changes caused by the presence of the cogeneration plant with associated transmission lines, electrical substation, and natural gas meter stations.

3.10.1 Existing Conditions

The proposed site for the BP Cherry Point Cogeneration Project is currently in the interior of the existing BP Refinery property. The proposed cogeneration site is approximately 25 acres of undeveloped land and is an estimated 370 feet south of Grandview Road east of the refinery site. An existing road that directly accesses this site from Grandview Road is located approximately 0.25 miles east of the main refinery entrance. Except for the corridor for the access road, a wide perimeter of the BP property adjacent to Grandview Road is planted with hybrid poplar trees. The dense vegetation screens much of the interior of the BP property from the view of passersby. A plume from the existing refinery cooling tower is somewhat visible from Grandview Road. The perimeter of the refinery property near the proposed site for the cogeneration plant is unlighted, except at the main gate entrance. Approximately one-eighth of a mile down the access road is a gatehouse, which is likely lighted at night. This gatehouse is just visible during daylight hours from Grandview Road.

BP has not yet determined the proposed sites for all equipment and facilities associated with the cogeneration plant. Some of these facilities, such as the natural gas meter stations, and electric substation, would be located near the proposed site for the cogeneration plant. Future environmental documentation should clarify the proposed locations for these facilities to permit evaluation of potential impacts on visual resources for each facility.

Based on this limited knowledge, both agency representatives and members of the public expressed concern over potential impacts on visual resources. People were concerned about views of the new buildings, stacks, and structures from existing roads during the daytime and at night. They were concerned about the potential need to remove existing screening vegetation prior to the construction of buildings or structures, particularly the electrical transmission line. They wanted to know about potential “plumes” that might be visible during different seasons of the year as well as under different weather conditions.

Methods used to assess potential impacts on visual resources during construction and operation of the plant should generally conform to generally accepted systematic approaches commonly used in environmental assessment documents. For example, BP could choose to use the Visual Management System developed by the U.S. Forest Service or the Visual Resource Inventory developed by the Bureau of Land Management. Potential impacts should be evaluated by assessing the visual quality of the project area, the viewer sensitivity, and the

visibility of changes from the sensitive viewpoints. The inclusion of visual simulations of construction sites and proposed buildings and structures would be helpful.

3.10.2 Environmental Issues of the Proposed Project

3.10.2.1 Construction

During the construction period, temporary fencing and lighting would be erected surrounding construction sites as well as equipment storage and laydown areas. The number of fenced and lighted areas would change with the schedule of construction activities related to the cogeneration site, the natural gas meter stations, the substation, and the electrical transmission lines. In addition, the numbers of construction vehicles and equipment at each site would vary for each such construction-related site. Any potential impacts on visual resources associated directly with these types of construction impacts would be expected to be temporary.

Residents living in homes nearby to construction sites, equipment storage, and laydown areas would be most affected by views of daytime construction activities and nighttime lighting. Travelers along public roadways or agricultural workers would most likely view construction activities during daylight hours, but for short periods of time on an intermittent basis. People visiting the nearby Birch Bay State Park would not likely be able to view project-related construction activities while recreating in the park. The specific makeup of viewers by type and sensitivity would change for each construction site associated with the proposed cogeneration plant and its associated facilities and should be evaluated.

Temporary land use impacts during construction, such as those from equipment storage and laydown areas, should be fully restored following the end of the construction activities. Fences and lighting should be removed. Temporary gravel roads and pads should be excavated and removed from the site. Native topsoil should be returned to the site and pre-construction vegetation should be re-seeded and/or replanted. Specific restoration plans should be developed for most construction, equipment storage, and laydown areas to ensure temporary visual impacts do not endure much beyond the construction period.

3.10.2.2 Operation and Maintenance

BP is currently working with engineers to more fully develop a process design for the BP Cherry Point Cogeneration Project as well as site layout plan. As such, the proposed layout of buildings and equipment has yet to be determined. The site layout for the electric substation, natural gas meter stations, potential water supply pipeline, and the various utility pipelines constructed between the refinery and the cogeneration plant could determine whether or not these facilities could be viewed from passersby on nearby public roads. The chosen route for the proposed electrical transmission lines would determine the extent existing vegetation would need to be removed, which potentially could alter existing vegetative screening around the perimeter of the refinery property. As such, care during the siting and layout of these facilities could reduce potential impacts on visual resources.

BP has stated that the design and construction of all buildings and structures would be completed in accordance with appropriate codes and standards. BP has stated that buildings on the site would likely consist of a steel framework covered with painted metal panels. The buildings, condenser, exhaust stacks, and other large outdoor equipment would likely be

painted neutral colors to minimize visual impacts. The size, shape, material finishes, and height of equipment, buildings, and potential towers or stacks, however, have not been finalized at this time. This information for both onsite and offsite buildings and structures would be needed to make future assessments of potential visual impacts.

A common concern regarding the development of any industrial plant is the construction of towers or stacks and potential views of “plumes.” The development of the proposed BP cogeneration plant would include both HRSG/combustion turbine exhaust stacks and a steam condenser unit. The height and design of each of these structures is determined by engineering considerations. Hot combustion products including carbon dioxide and water vapor would be the primary emissions emitted from the exhaust stacks. These exhausts would likely not be visible most of the year, though some steam could potentially be visible on cold moist days during winter months. The current plant concept presented by BP includes an air-cooled condenser for the cooling of the low-pressure steam from the turbine exhaust. For a water-cooled condenser, weather conditions, including air temperature and humidity, may at times create the appearance of “plumes” from this structure. From an air condenser, though, nothing would be emitted from this structure other than heated air, which would not be visible. A description of the final design structures proposed as part of the cogeneration plant and an analysis of the potential visual effects from apparent “smoke” or “plumes” should be included in future environmental documentation.

As described above, development of the proposed cogeneration plant and associated facilities could involve the development of several isolated sites. Some of the sites would be on existing BP Refinery property and other sites would be newly acquired. The development of all such properties should include the preparation of landscape plans. Landscaping would provide some screening or softening of views of new facilities. These landscape plans should be developed consistent to Whatcom County ordinances as well as security and safety considerations.

Consistent with BP safety and security practices, almost all buildings and equipment constructed as part of the proposed cogeneration plant and its associated facilities, would be fenced and lighted. The existing refinery-owned property is entirely enclosed by a chain-link security fence approximately 8 feet high and is topped with three strands of barbed wire. The refinery also maintains its own security patrols 24 hours per day, 365 days per year. BP has stated the electrical substation would have its own perimeter fence and gates of similar construction to prevent unauthorized access. The gas metering stations would be likewise equipped. Tall structures at the cogeneration plant, especially the exhaust stacks, would be fitted with aviation warning lights. The use of directional lighting and carefully placed landscaping could minimize potential impacts on visual resources, yet implement needed safety and security practices.

3.10.2.3 *Light and Glare*

At night, outside lighting at the cogeneration plant could be visible from main viewpoints, including the possibility of flashing warning lights on the stacks. The issue of light and glare was raised by residents of White Rock, B.C. as well. During daylight, a potential for glare off windows and metallic elements of the plant could exist. The overall impact of light and glare would likely not be significant because the number of viewers would be small and the majority of viewers would see the site for a short duration. These issues should be fully evaluated in the ASC environmental report.

3.11 Population, Housing, and Economics

This section discusses a framework of analysis of potential impacts on population, housing, and economic issues that would likely be associated with the proposed BP Cherry Point Cogeneration Project. Potential impacts could occur during the construction and/or operation and maintenance of the cogeneration plant. Particular variables and issues should be identified in more detailed future environmental assessment.

3.11.1 Existing Conditions

The BP Cherry Point Cogeneration Project is proposed to be located within the boundaries of the existing property owned by BP at its petroleum refinery in Whatcom County, Washington (see Figure 4). The refinery is located in an industrial complex that is surrounded by agricultural lands, scattered rural residences, and small towns. The City of Ferndale (2000 pop. 8,758) is located 4 to 6 miles to the southeast of the BP refinery. The county seat is Bellingham (2000 pop. 67,171) and is located approximately 15 miles to the southeast.

Whatcom County is a rural county. Much of the county is mountainous and forested. Historically, the county's economic base was the timber industry. Sawmills and pulp and paper mills are located in the county. The BP petroleum refinery located at Cherry Point was constructed in the early 1970s to process Alaskan crude oil. The Port of Bellingham also has maintained strong economic and trade ties between Washington and the coastal towns of British Columbia and Alaska.

More recently, however, the economic base of the region has been shifting. The long-established Georgia-Pacific Company paper mill in Bellingham has closed part of its operations, and BPA has requested regional aluminum plants, including the Alcoa-Intalco Works Plant (located immediately south of the BP Cherry Point Refinery), to shut down in order to reduce regional energy consumption. People in the community are concerned about the influx of workers into the community and potential impacts, positive or negative, that could result from the construction and operation of the cogeneration plant. At the same time, residents are concerned that without the construction of additional energy generation resources in the community, the economic and industrial base of the region may be weakened for the near-term, if not long-term future.

3.11.2 Environmental Issues of the Proposed Project

3.11.2.1 Construction

The construction of a new cogeneration plant in Whatcom County would create short-term impacts in the community. Construction workers would be hired to build a number of new facilities associated with the new electric generation plant including:

- the cogeneration plant equipment, administrative building, and employee parking area,
- the interconnecting pipelines between the existing BP refinery and the cogeneration plant for the refinery gas and emergency fuels,
- a new electric substation, low-voltage power lines between the cogeneration plant a substation, and the new high voltage transmission lines connecting the plant substation to the BPA electrical transmission grid,

- a water supply pipeline for makeup water,
- new natural gas meter stations and gas supply pipeline connections between the existing natural gas pipelines serving the BP refinery and the cogeneration plant.

BP proposes that the construction of the cogeneration plant would occur over approximately a two-year period and would require the use of a wide variety of skilled construction workers. Some of these workers would be hired from the local work force and others would be specialists who would need to be hired from outside of the region.

BP currently estimates the peak labor force during plant construction to be approximately 400 individuals. This peak labor force period is estimated to last approximately six months. BP has not yet provided information regarding the proposed schedule of work among the primary components of the project. Nor is it clear from the work force estimates whether or not this estimate includes workers already employed at the BP refinery or those who would perform construction associated with the power lines, water supply pipeline, steam pipelines, emergency fuel pipeline, and natural gas pipeline facilities. BP should provide information that clarifies these issues in future environmental documentation.

Potential construction impacts on population, housing, and economics could occur depending on BP's plans to manage the construction workers. The estimated proportion of the construction workers hired from outside of the region compared to those hired from the local labor force would be a critical factor in determining potential impacts on the community.

- Would this number of workers be employed for long periods, such that family members might move to the area for the duration of the construction project?
- Would construction workers likely rent homes or apartments in the area, or would they stay in local motels, recreational vehicle parks, campgrounds, or make other temporary housing arrangements?
- Would the number of workers moving temporarily to the area demand a sizable share of the normally available housing?
- Would major refinery maintenance activities be planned to occur at the same time as cogeneration plant construction?

Each of these issues is important in the assessment of potential direct effects on population and housing.

The influx of additional workers into the community could indirectly result in other employment impacts in the area. For the duration of the construction period, construction workers would spend wages in the community for food, goods, and services. Depending on the number of workers, this increased demand in the community could pressure local businesses to hire additional workers to meet demand. For example, local restaurants may need to hire extra waiter staff to handle the busy periods following shift changes. Similarly, the business activity associated with the construction work could result in increased hires in local business/equipment supply or financial services firms.

During the construction period, both workers directly hired for the project and those indirectly hired in the community as a result of the increased business demand in the community, would spend money in the community for food, clothing, entertainment, and other necessities and services. Similarly, business activity associated with the construction project would purchase at least a part of the required materials and supplies from local businesses. These expenditures would result in increased sales tax revenues collected from local businesses. Though some of this money would go to the state of Washington, some of it would be returned to local governments as increased revenue.

In summary, potential impacts on population, housing, and economics would be expected to occur as a result of constructing the proposed BP Cherry Point Cogeneration Project. Variables that should be investigated include the following: the number of direct and indirect jobs created during construction, the likelihood these workers would be hired from the local labor force, the likelihood that workers and possibly their families might move to the community, the vacancy rate of housing likely to be used by construction workers, the likelihood and amount of local expenditures associated with the purchase of materials and supplies from local businesses, the estimated amount of local expenditures from workers, and the anticipated amount of local government sales tax revenues resulting from local expenditures. The quantification and qualification of these issues provide a base from which to evaluate the degree of adversity and significance of these potential impacts.

3.11.2.2 *Operation and Maintenance*

BP plans to operate the proposed BP Cherry Point Cogeneration Project 24 hours per day and 7 days per week. BP states that it has estimated a total of 35 individuals would be employed at the plant and these individuals would work in two shifts. This information is assumed to refer only to workers working directly for the cogeneration plant, and not related to the operation of the electrical transmission lines, substation, pipelines, or natural gas pipeline facilities. It is unclear if this number includes any workers who could potentially be re-assigned from other jobs at the refinery. Future environmental documentation should clarify these points.

Similar to the potential construction impacts, the operation and maintenance of the cogeneration plant, electrical transmission lines, substation, pipelines, and natural gas pipeline facilities could result in impacts on population, housing, and economics. The estimated number of long-term permanent workers, however, appears to be clearly smaller than the peak construction work force. Though the highly skilled workers may not be hired from the local work force, local workers would likely fill other job categories. The number of workers hired from outside of the region, however, would cause workers and their families to move to the area. Because of the small number of workers, it is likely the existing availability of housing would meet their needs considering the likely salary range of these workers and the market cost of housing in the area.

Based on the estimated number of operation staff at the cogeneration plant and the likelihood that only a small proportion of these workers who would move to the area, only a few indirect jobs would likely be created from the operation and maintenance of the cogeneration plant. The few jobs created, however, would increase local wage expenditures in the local communities and could increase local government sales tax revenues. Calculations of these potential local government revenues, however, may prove them to be insignificant.

More importantly, the operation and maintenance of the cogeneration plant would require regular and on-going expenditures for services, materials, and supplies. Some of these purchases would go to local businesses. Other purchases may originate with businesses located outside of the region and would be shipped to the project site. To understand these long-term economic benefits to local businesses, it would be helpful if BP could provide an estimate of the average annual purchases of local goods and services and the estimated sales tax revenues that would likely be realized by local communities.

Whatcom County and its communities would also realize additional tax revenues. The construction of the proposed cogeneration plant and associated facilities would result in taxable improvements to real property. Estimated construction costs of approximately

\$450 million would result in a sizable increase in property tax revenues paid by BP to Whatcom County and distributed to county local governments. The operation of the cogeneration plant and/or the sale of electric energy also could potentially increase business and occupation tax revenues or other related taxes collected by Whatcom County. Though a portion of these tax revenues would be retained by Washington State, a portion of these tax revenues would be re-distributed back to local governments in Whatcom County. An estimate of these potential tax revenues to city and county governments in future environmental documentation would help provide evidence of potential public benefits arising from the construction of the proposed BP Cherry Point Cogeneration Project.

3.12 Public Services and Utilities

This section generally describes the potential environmental impact issues related to public services and utilities associated with the proposed construction of the BP Cherry Point Cogeneration Project. Key public services topics discussed include police, fire, emergency medical, schools, and parks. Utilities discussed include: electricity, natural gas, communications, water supply, sewage, and solid waste. The focus of this section is potential impacts on municipal and special district services and utilities. Analysis of these issues would form the framework for future environmental documentation for the proposed project.

3.12.1 Existing Conditions

3.12.1.1 Police, Fire, and Emergency Medical

BP proposes to construct a cogeneration plant at the existing BP Cherry Point Refinery, which was constructed in the early 1970s to process Alaskan crude oil. It is an industrial plant that employs hundreds of workers. Public safety issues such as police, fire, and emergency medical services associated with the refinery primarily are provided by BP. The refinery maintains its own fire and emergency response team in coordination with the local fire jurisdiction having authority, which operates under a unified command structure to respond to fire and emergency responses. The refinery has its own security officers that patrol the premises 24 hours a day, 365 days a year. The Whatcom County Sheriff's Office responds to only major incidents. As a major industrial plant, BP also has an Emergency Response Plan developed in cooperation with local fire and emergency medical services. Together, the government and private provision of these services has been fine-tuned over the past 30 years.

During the public involvement process associated with the preparation of the PSS for the proposed BP Cherry Point Cogeneration Project, both agency and public comments identified general concerns for potential impacts on municipal services, such as police, fire, and emergency medical services. These public services could be affected during either the construction or operation of the proposed cogeneration plant and should be addressed in ASC environmental report.

3.12.1.2 Schools and Recreation

As a refinery and power plant, the industrial plant complex itself does not affect the local school districts. Rather, children of existing plant employees and children of the proposed plant employees would attend area schools based on the location of their residences.

Similarly, the workers and their family members would use local recreational facilities and parks. Visitors to area parks, especially Birch Bay State Park, however, may be able see or hear noises coming from the refinery. The proposed cogeneration plant could affect schools and recreational resources in a similar indirect manner and this should be investigated in more detail by BP.

3.12.1.3 *Electricity and Natural Gas*

The refinery is served by local energy utilities. As a major consumer of both electricity and natural gas, BP is able to purchase these utilities directly from producers due to the existing unregulated market for these commodities. BP contracts with Puget Sound Energy to purchase approximately 85 mW of electricity needed by the refinery, though current demand has fallen to approximately 10 mW due to the use of the onsite Solar turbines. This energy is delivered to the refinery via two 115 kV transmission lines owned by Puget Sound Energy. The power lines approach the refinery from the north along Grandview Road. Similarly, BP purchases natural gas directly from a Canadian supplier, Westcoast Energy Ltd. The natural gas is transported across the U.S. Canadian border just north of Sumas, Washington through the BP-owned pipeline that serves BP and the Alcoa-Intalco Works industrial plants. In addition, Cascade Natural Gas operates a pipeline adjacent to the BP-owned pipeline that previously provided natural gas to the refinery.

The proposed cogeneration plant would consume large quantities of natural gas and would generate a total estimated 720 mW of power. Most of this electricity would be available for purchase by both utilities and large consumers. Agencies and members of the public are acutely aware of the current regional energy crunch, especially considering recent layoffs and plant closures due to the high cost of electric energy. People are concerned about the short-term and long-term effects of building this power generation plant as well as the consequences of not building it from both a supply and energy cost point of view. Many also asked if the existing natural gas pipeline would be sufficient to meet the needs of the cogeneration plant. Recognizing that some of these issues would be confidential corporate decisions, it would be helpful if BP could disclose additional information concerning these potential effects on electricity and natural gas in future environmental documentation on the proposed cogeneration plant.

3.12.1.4 *Other Utilities*

Public utilities or local special districts provide other utility services supporting the BP Cherry Point Refinery. One of the local telephone companies, Qwest, provides communication services to the refinery. The Birch Bay Water and Sewer District provides potable water supplies under contract to the refinery. BP has stated that the refinery does not use the full amount of the water supplies under contract. BP has not provided any information to date regarding the method of solid waste disposal used at the refinery.

Regarding these other utilities, the public, agencies, and Indian tribes are mostly concerned about the potential large quantities of water that could be consumed at the proposed cogeneration plant. People worry that should the plant use water to cool and condense the steam, water supplies in the region could be greatly depleted. In fact, the project employs air cooling, which reduces water consumption from 6.5 million gpd to 0.5 million gpd. Others suggested that BP consider using reclaimed water from the Birch Bay Water and Sewer District's water treatment plant for industrial water uses at the plant. Clarification of these water, sewage, and solid waste issues would be helpful.

3.12.2 Environmental Issues of the Proposed Project

3.12.2.1 Construction

Police, Fire, and Emergency Medical

The construction of the proposed cogeneration plant would not likely require additional police, fire, and emergency medical services. However, equipment or vehicles could be stolen from work sites. Equipment or constructed structures could catch fire and construction site accidents could require emergency medical services. With an estimated peak number of 400 workers on site, the need for these services could be great. As such, BP should provide a description of public and private services that would be used to meet these needs.

Schools and Recreation

Potential impacts on schools and recreational resources would mostly be dependent upon the number of the estimated 400 construction workers who move to the area and bring their families. Potential impacts on schools would also mean that workers' families resided in the area during the school year, September through June. Workers themselves would have time off from their construction work and would likely use area recreation facilities and parks. If family members moved to the area, they too would use these resources. The effect of either worker or family use of the area's recreation and public education resources may or may not be significant.

Construction of some of the various utility facilities associated with the proposed cogeneration plant (electrical transmission lines or potential water supply pipeline) also could directly affect recreational resources. Careful siting and routing of these facilities should avoid any direct impacts of recreational properties. The preparation of construction transportation management plans should also minimize effects to motorists driving to or from area parks.

Electricity and Natural Gas

Construction of the proposed cogeneration plant and its associated facilities would require electricity and perhaps natural gas resources. Depending on the amount and time duration these energy resources would be used, the construction contractor could possibly use onsite generators or could extend a power line from the refinery to the construction sites. Portable generators would more than likely meet the electric needs for construction of the electrical transmission lines and possibly the water pipeline. Clarification of the specific sources of electricity that would be used to support construction activities at each of the construction sites associated with the cogeneration plant should be made by BP in future environmental documentation for the project.

Other Utilities

The proposed two-year construction period for the cogeneration plant would require temporary communication, water, sewer, and solid waste services. A project construction office would likely be established at the cogeneration plant site, which would require communication services. In contrast, cell phones, pagers, and portable computers would more than likely be used by construction personnel assigned to construction activities

associated with the ancillary plant facilities including: the electrical transmission lines and substation, the natural gas meter stations, and possible water supply pipelines. Potable water would likely be trucked to construction sites and portable sanitary facilities would likely be placed at each site. A wide variety and amount of construction debris would also be produced at each construction site. Some waste materials potentially could be recycled, but others would need to be disposed, possibly including potential toxic or hazardous materials. A description of these planned utility services, the likely provider, and an analysis of the capability of the utility to provide these needed services during the construction phase of the project should be included in the environmental reports accompanying the ASC application submittal.

3.12.2.2 *Operation and Maintenance*

Police, Fire, and Emergency Medical

Potential operation and maintenance impacts on public police, fire, and emergency medical services would be expected to be small in comparison to the services currently provided to the BP refinery. Only an estimated 35 new employees would be hired to operate the cogeneration plant. The proposed site for the cogeneration plant would be interior to the existing BP property boundaries and close to existing fire and emergency medical services that could be provided by refinery personnel. It would be important for BP and the jurisdictions having authority to define the extent of additional police, fire, and emergency services, if any, that would be needed from community services. An emergency response plan more than likely should be prepared for the cogeneration plant as well. It would also be important for BP to define the extent of additional police, fire, and emergency medical services if any, that would be needed from community services.

Schools and Recreation

Potential direct effects to schools and recreational resources are unknown at this time. Schools and parks would be considered sensitive sites from which to measure potential visual, noise, or air quality impacts. As such, these issues should be investigated in future environmental documentation for the proposed cogeneration plant.

Like the construction impacts on schools and recreational resources, potential impacts during operation and maintenance would be dependent upon the number of new hires at the cogeneration plant from outside of the region who move their families to the area. Considering BP anticipates only 35 individuals would be hired, only a small number of new employees and their families would likely move to the area. Estimated numbers of individuals and accompanying family members could help allay concerns that the proposed cogeneration plant would result in significant impacts on local schools and recreational facilities.

Electricity and Natural Gas

In contrast to the usual concerns about the consumption of both electricity and natural gas, concerns about the proposed cogeneration plant focus on the long-term consumption of large volumes of natural gas and generation of large amounts of electricity. At this time, BP has not estimated specific quantities of natural gas that would be needed, but the amount would be sizable. Both agencies and members of the public are concerned about the capacity of the existing pipelines to deliver the natural gas supplies in addition to current supplies provided to

the BP refinery and other customers. They are concerned about the ability of natural gas producers to meet the long-term demand for these quantities of natural gas. They are concerned about the long-term economic viability of the cogeneration plant considering the current cost of natural gas and potential cost variability.

Similarly, agencies, Indian tribes, and members of the public are aware of the current “energy crunch” in the Pacific Northwest and potential loss of jobs and local economic health if new sources of electric energy resources are not made available to regional electric utilities, including Puget Sound Energy and BPA. BP has stated that the proposed cogeneration plant would meet future refinery demands (approximately 90 mW), thus decreasing area demand. In addition, the proposed 720-mW cogeneration plant would sell remaining supplies (approximately 635 mW) to utilities and large industrial customers. The public would like Whatcom County industries, businesses, and utilities to have the opportunity to purchase the new supplies of power, perhaps at below-market or at-cost prices to ensure the local community realizes benefits to balance likely environmental impacts. People hope the construction of the proposed cogeneration plant could alleviate some of the near-future constraints (supplies and high costs) in electric energy supplies in the region. Some of these issues may be confidential corporate matters, but it would be helpful if BP could provide clear statements concerning these issues in project environmental documentation accompanying the ASC application.

Other Utilities

Operation of the cogeneration plant would require the support of communication, water, sewer, and solid waste services. Communication services would be installed at the cogeneration plant administration building. This demand for communication services would not likely be significant and would likely be provided by a local communications company.

Potable water would be needed to meet drinking water and sanitary water uses at the cogeneration plant administrative building. Potable water would not be needed at the electric substation or natural gas meter stations. Water for the fire protection system would also be needed for the new cogeneration plant. Additional water may also be needed at each of these facilities to irrigate site restoration and/or landscaping. Presumably, the Whatcom County PUD No. 1 would provide these water supplies. If needed, the PUD potentially could supply an average of an additional 4.5 million gpd of water, but BP plans to use air-cooling, which means only approximately 500,000 gpd will be needed as makeup water. Public comments have also suggested that BP consider using treated water from the nearby Birch Bay Water and Sewer District, rather than potable water from the PUD. Clarification of which facilities associated with the proposed cogeneration plant would need potable and/or industrial process water and the amounts of water would be important to fully understand any potential effects on local water utilities.

Sanitary sewer services to support the operation of the proposed cogeneration plant would be needed only to meet the needs of the estimated 35 workers employed at the cogeneration plant. These services are proposed to be tied into the sanitary sewer system for the main refinery. Operation of the offsite facilities, including the BPA interconnection substations and natural gas meter stations, would likely be automated. Workers would visit these facilities for short periods of time on an occasional basis for maintenance activities. As such, sanitary sewer systems would not likely be installed at these facilities. A full description of the proposed systems to meet the needs of each of the proposed facilities associated with the cogeneration plant and the potential impacts would need to be addressed in future environmental documentation.

It is unknown exactly how much or what kinds of solid waste materials would be generated from the operation and maintenance of the cogeneration plant. Small quantities of waste paper and other office related wastes would likely be generated from the administrative office at the cogeneration plant. This waste could be recycled, combined with similar wastes collected at the BP refinery, and/or could be picked up by the local waste disposal company. The electric substation and natural gas meter stations would likely be unmanned and would not generate significant quantities of such wastes. Potentially, however, significant quantities of solid wastes could be generated at the cogeneration plant. The types and amounts of such wastes are unknown at this time. Moreover, some of these wastes could be toxic or hazardous. The project proponent should consider the preparation of a solid waste management plan for the cogeneration site. Full disclosure of the types and amounts of all solid wastes would be helpful to assess if there could be any potential impacts on local or regional solid waste utilities or facilities.

3.13 Cultural Resources

This section provides a framework for the analysis of potential cultural and historic resource issues associated with the construction and operation of the proposed BP Cherry Point Cogeneration Project and its associated facilities. This analysis should address existing conditions, potential impacts of proposed construction and operation, and proposed mitigation measures to avoid or minimize such impacts. This section provides the framework for a more detailed analysis of these issues to be included in the environmental report section of the ASC.

3.13.1 Existing Conditions

3.13.1.1 Regulatory Framework

At this point in the project development, BP has only a conceptual design for the proposed cogeneration plant. The proponent has presented a preferred site for the cogeneration plant. This site is undeveloped land, approximately 25 acres in size, and is located in the interior of the existing refinery property owned by BP. Other associated facilities, including an electric substation, power lines, natural gas pipeline connections, and a water pipelines would also be constructed. Several of these facilities would be sited in close proximity to the proposed site for the cogeneration plant, but others could be located quite distant, such as the possible water supply pipeline.

Currently, BP is working on engineering for the proposed cogeneration plant, which in turn would determine specifics affecting the siting and routing of the associated facilities. Once BP has firm plans for the development of the cogeneration plant and related facilities, then specific sites and routes of proposed utility lines, pipelines, and associated facilities could be evaluated for potential cultural and/or historic issues.

However, BP has begun to look into cultural and historic issues. Although BP has not conducted any preliminary field investigations into the likelihood that either cultural or historic resources could be found at the proposed site for the cogeneration plant, BP has initiated consultation activities with the Lummi Indian Nation, which has a recognized tribal reservation located to the south of the BP refinery.

Other Indian tribes may also have interests in the proposed development of the cogeneration plant and its associated facilities. As part of EFSEC's efforts to prepare the PSS for the proposed BP Cherry Point Cogeneration Project, a total of 10 tribes were contacted. In addition to the Lummi Indian Nation, these tribes included the following: the Jamestown S'Klallam Tribe, the Nooksack Indian Tribe, the Port Gamble S'Klallam, the Sauk-Suiattle Tribe, the Stillaguamish Tribe, the Suquamish Tribe, the Swinomish Indian Tribal Community, the Tulalip Tribes, and the Upper Skagit Tribe. Based on usual and accustomed territories of these tribes and the potentially large geographic region encompassing local anadromous fish migration patterns, any of these tribes could have jurisdictional interests in the proposed cogeneration project. Based on direct contacts with tribal representatives, only the Upper Skagit Tribe has stated the proposed project was "outside of the Tribe's boundary of influence" (see Chapter I).

In general, the interests of tribes include the protection of Indian burials and other sacred sites, as well as the perpetuation of traditional activities such as hunting, fishing, and native plant gathering. This long-standing use of natural resources is integral to the maintenance of a tribe's culture. Additional consultation efforts should be pursued by BP to clarify specific interests of each tribe for the lands likely to be affected by the proposed project.

The analysis of potential impacts on cultural and historic resources should follow the methods prescribed by federal regulations. The proposed construction of electrical transmission lines to interconnect to the BPA electric grid would require federal agency authorization in addition to EFSEC approvals. Consistent with federal law, federal authorization could not be given until the federal lead agency, BPA, had conducted environmental review consistent with NEPA requirements and the following laws: the Antiquities Act of 1906, Historic Sites Act of 1935, the National Historic Preservation Act of 1966, the Archaeological Data Preservation Act of 1974, the Archaeological Resources Protection Act of 1979, and the Native American Graves Protection and Repatriation Act of 1990. In particular, the assessment of potential cultural and historic resource issues associated with the proposed BP Cherry Point Cogeneration Project should follow guidelines set forth in the Section 106 Review process in the National Historic Preservation Act.

3.13.2 Environmental Issues of the Proposed Project

3.13.2.1 Construction

The assessment of cultural and historic resource issues focuses on the analysis of likely direct impacts on bones, artifacts, historic objects, or structures that would occur during construction of the proposed project and its associated facilities. Per the Section 106 Review process guidelines, this assessment process should review available literature concerning cultural and historic resources in the region, including traditional cultural properties. BP or its consultant should conduct field investigations for all sites where excavation activities would occur. This evaluation should include all onsite and offsite real properties, easements, and temporary construction easements affected by construction activities associated with the cogeneration plant, substation, electrical transmission lines, natural gas meter stations, and any other pipelines. The field investigations should minimally examine surface characteristics, but potentially could include some subsurface field excavations.

The assessment process should include consultation with the Washington State Department of Community Development, Office of Archaeology and Historic Preservation. BP should also consult with Whatcom County agencies, if any, to collect information about potential

cultural and historic resource issues. Based on the literature review and consultation with state and local agencies, BP should also consider continuing contact with tribes that may have an interest in the proposed project.

Based on the literature review, field investigation, and consultation efforts, BP or its consultant should prepare a summary report. This report should present evidence sufficient to make preliminary assessments of potential impacts on cultural and historic resources. This summary report should also present any proposed mitigation measures to avoid, minimize, or mitigate potential impacts.

The mitigation plan should include the monitoring of all ground-disturbing construction activities by a qualified archaeologist. Based on pre-construction consultation activities, tribes may also wish their own representatives to be onsite during all or some of the construction activities. Should materials be discovered, the archaeologist should have the authority to stop any further construction activities from occurring in the immediate vicinity of the discovered materials. The archaeologist should also contact all appropriate state, federal, and tribal officials as soon as possible to notify them of the material discovery. This action should initiate a government-to-government consultation process to resolve what actions, if any, should occur. Once the consultation process has concluded, then the archaeologist should have the authority to authorize the resumption of the construction activities in the discovery area.

A summary report should accompany the submittal of future environmental impact assessment documentation for the proposed cogeneration plant project, but should also respect the sensitive and potentially confidential nature of some of the information. This information would help EFSEC prepare its required SEPA documentation. Furthermore, the information would be used by the lead federal agency in its determination and assessment of potential effects to cultural and historic resources per the NEPA requirements.

3.13.2.2 *Operation and Maintenance*

As described above, the focus of the assessment activities associated with cultural and historic resource issues concerns impacts during construction, not operation. The operation of the proposed cogeneration plant would not likely affect cultural or historic resources. Any existing aboveground structures within the construction impact area would already have been removed. The operation of the cogeneration plant, substation, natural gas meter stations, and any pipelines would not cause additional ground-disturbing activities. Once installed, water, steam, refinery fuel gases, and natural gas would simply flow through the constructed pipelines. Electric energy would flow along the power lines.

Moreover, the operation of the cogeneration plant and its associated facilities would not likely result in additional ground-disturbing activities. More than likely, areas landscaped around constructed facilities would more than likely already have been disturbed during construction. Similarly, routine maintenance activities associated with the electrical transmission line and several pipelines would likely fall within the previously disturbed areas in the easements. It could be advantageous, however, for BP to consider developing a standard plan to cover unexpected ground disturbing maintenance activities that could occur within the confine of the project site.

3.14 Traffic and Transportation

This section generally describes the potential environmental impact issues related to traffic and transportation associated with the proposed construction of the BP Cherry Point Cogeneration Project. Transportation issues addressed include roadways, railways, and waterborne traffic. The focus of this section is potential impacts on public transportation facilities and services as a result of transporting people and materials to and from the project sites. Analysis of these issues would form the framework for future environmental documentation for the proposed project.

3.14.1 Existing Conditions

3.14.1.1 Roadway Traffic

The proposed generation plant would be located on Grandview Road approximately 6 miles west of Interstate 5. At the project site, Grandview Road is a two-lane roadway with narrow (2- to 3-foot) gravel shoulders, drainage ditches, and no sidewalks. Grandview Road is classified as a collector according to the Washington State Department of Transportation (WSDOT) road classification system. The posted speed limit is 50 mph.

Traffic is generally light with the refinery serving as the primary destination for the majority of vehicle trips, especially truck traffic. The community of Birch Bay also accesses Interstate 5 along Grandview Road.

3.14.1.2 Waterborne, Air, and Rail Traffic

Petroleum tankers operate in the Cherry Point area delivering crude oil from Alaska to the BP (ARCO) pier owned and operated by BP in the vicinity of the plant site. Barges also operate from this pier to move refined products to market. Barge traffic has been higher for approximately the last year or so because of damage to the main petroleum pipeline in Whatcom County. As a result, BP has had to move much more refined products by barge than it would normally ship. No other significant shipping occurs in the immediate area of Cherry Point.

The nearest regional or municipal airport in the vicinity of the plant site is the Bellingham Airport approximately 12 miles south of the project site. Some larger aircraft use this airport, and there is limited scheduled airline services. Primarily small planes make use of this facility; however, the frequency of this type of use is unknown.

An active Burlington Northern Santa Fe Corporation railroad line with a north/south alignment is located about one half mile east of the cogeneration plant site. The proposed BP transmission lines would extend over the rail line at one or possibly two points.

3.14.2 Environmental Issues of the Proposed Project

3.14.2.1 Construction

Roadway Traffic

The plant site would likely be accessed from Grandview Road. A complete road loop is expected to be provided around the plant, with laterals to specific areas inside the plant as required. No new permanent roads are planned outside the plant road loop. All traffic associated with the proposed project would enter or leave the project site from Grandview Road. The existing and proposed driveway intersections would continue to be regulated by stop signs to control vehicles entering onto Grandview Road.

Trucks would primarily be used to deliver construction equipment and materials. Many of these trucks would have a gross vehicle weight as great as 105,500 pounds. The surface condition of the pavement near the site is good, and the delivery of construction materials and equipment is not expected to significantly degrade existing conditions.

It is not known how the combustion turbines and other large equipment would be transported to the site. It is likely, however, that this equipment would be transferred from either a railroad car or barge to an oversized truck. This transport would have a short-term impact on traffic along Grandview Road or other roadways used due to temporary road closure.

The peak onsite workforce is expected to be approximately 400 people during possibly a 6-month period; the average workforce for the remaining 21 months of construction would be expected to be less than 300. The workforce in either case could add significantly to the average daily traffic (ADT) for the existing road system at and near the plant site. The nature and extent of these effects would depend on where the workforce resides and how the workers commute to the site, as well as the number of road-based deliveries of materials and equipment to the site. In their ASC, BP should describe the anticipated commuting patterns based on expected sources of workers and indicate whether or not intersection improvements are warranted to accommodate transit by the construction workforce during the approximate two-year construction period. Workers' vehicles would probably be parked on the BP property adjacent to the cogeneration site.

It is important to note that construction of the cogeneration plant would be managed with other potential construction and maintenance activities at the refinery. BP reports that construction and maintenance activities occur from time to time with the number of construction workers at the oil refinery averaging about 400. This number can peak at about 2,000 for a two- to three-week period every two to three years depending upon the construction and maintenance underway at the time.

Construction of any water pipelines would also require a workforce of potentially 40 and would be completed over a period of approximately two to three months. Workers would likely park their personal vehicles, trucks, and equipment on the BP refinery site. Although a more detailed construction management plan is needed to evaluate traffic impacts due to pipeline construction, it is anticipated that this activity would result in a minor and short-term impact on local traffic.

Waterborne, Rail, and Air Traffic

Construction materials for the facility most likely would not require rail transport. Large primary components of the facility (such as turbines), however, may well be delivered by rail or barge and transferred to trucks. Such transport is anticipated to be incidental, and the transfer of components to trucks for delivery onsite would likely occur at existing local rail spurs or barge facilities. A crane could be used to offload equipment onto trucks that would then use Grandview Road or possibly Brown Road to transport the equipment to the site. If rail transport is used, it is expected that Union Pacific Railroad would be able to coordinate transport and unloading activities without affecting their system. It is unknown what reasonable options may be under consideration for barge transport.

The plant would not need other waterborne or air transport during construction of the facilities, and there would be no impacts on either mode of transport.

3.14.2.2 Operation and Maintenance

Roadway Traffic

The BP Cherry Point Cogeneration Project is expected to operate 24 hours per day, 7 days per week, with a total new labor force of about 35 people in addition to existing refinery workers. Some workers would work standard office hours, while others would work 12-hour shifts.

Traffic would likely enter the site from Grandview Road through the proposed new gate. Travel demand on this road when the proposed facility is operational would be composed of three elements:

- existing traffic,
- future non-project traffic, and
- forecast project-generated traffic.

Future non-project traffic growth should include other projects that are planned but not yet operational, the effects of population growth, and changes in traffic patterns due to street improvements or operations. No known projects in the vicinity would add to future traffic volumes. Background growth in traffic volumes is likely to remain unchanged or increase at a very low rate each year.

Project-generated traffic volumes would be produced by employees traveling to and from the site as well as truck traffic generated by the operation of the facility. Project-generated traffic volumes would be minimal, with no more than about 25 individuals working in operations expected to be present onsite at any point in time (including shift change and training). Although specific traffic generation data should be provided by BP in their ASC, the likely traffic increase would be low and the cumulative volumes on Grandview Road are expected to remain reasonably low relative to the capacity of the roadway.

Waterborne, Air, and Rail Traffic

Operation of the facility would not require waterborne, air, or rail transport except for the possible and unusual need to replace a major piece of equipment. In that case, rail or barge transportation may be used but is not expected to negatively affect the rail system.

The exhaust stacks would be expected to have warning lights installed and operating in accordance with the requirements of the Federal Aviation Administration. Although the presence of the plant, the stacks, and the new 230-kV transmission lines would increase the potential for airplane collisions, air traffic in the area is likely low since the nearest airport is 12 miles away and no major destination areas are located in the vicinity of the plant site. The two BPA 230-kV transmission lines, which are aligned north/south to the east of the proposed site, represent an existing hazard, and construction of the plant is not expected to substantially increase that hazard. As a result, it is not anticipated that the plant would result in a significant impact to air traffic.

No issues were raised by the public or agencies regarding concerns to air traffic or railways.

3.15 Health and Safety

This section generally describes the potential environmental impact issues related to health and safety associated with the proposed construction of the BP Cherry Point Cogeneration Project. These issues include hazardous materials handling, worker safety, pipeline safety, and the safety of local residents.

3.15.1 Existing Conditions

The proposed plant site encompasses approximately 25 acres of land owned by BP, adjacent to their refinery in Whatcom County, Washington. The proposed power plant site is undeveloped. Land surrounding the refinery is zoned for industrial or rural use and is generally undeveloped. The nearest recreation site is Lake Terrell, located approximately 1 mile from the site. The plant would be located within the Whatcom County designated urban growth area.

3.15.2 Health and Safety Issues for the Proposed Project

Health and safety issues associated with the power plant project can be divided into those related to construction and those to facility operations and maintenance. The health and safety issues within each of these process categories can further be divided as pertaining to either facility personnel or the general public. Discussion of these issues is covered under the following general headings:

- requirements to protect employees from health and safety hazards,
- pipeline safety,
- catastrophic events at the proposed cogeneration plant and the potential effect on the surrounding land area and human population,
- increased traffic and associated hazards due to the proposed cogeneration plant, and
- hazardous materials usage and hazardous waste generation.

3.15.2.1 Construction

Construction health and safety issues in Washington are governed through a myriad of regulations largely administered by the Washington Department of Labor and Industries and, for pipelines, Washington Utilities and Transportation Commission (WUTC). The handling and disposal of hazardous materials, likewise, is largely governed by Washington Department of Ecology regulations. Federal regulations can also apply. Some of the regulations specific

to the health and safety topics outlined above are summarized in the following sections along with key construction-related health and safety issues.

Protection of Employees

Protection of employees (construction workers) is largely governed by Washington Industrial Safety and Health Act (WISHA) health and safety regulatory requirements under WAC Chapter 296.

Pipeline Safety

No specific issues were raised relative to construction safety during construction of new connections to the pipelines. Activities covered by WISHA under general construction safety would apply, however.

The WUTC raised concerns about accelerated pipeline corrosion in the presence of strong electric fields and cautioned that cathodic protection should be examined for the existing pipelines as well as for the proposed new pipeline connections. In addition, the WUTC also raised concerns about odorization of the natural gas after it has been received from the distribution pipeline, since the gas flowing in the main distribution pipeline is not odorized.

Catastrophic Events

The potential for catastrophic events would be primarily after construction was complete.

Traffic

Safety regulations pertaining to a new access road to the power plant and requirements for traffic control flaggers during construction if activities impact Grandview Road are included under WAC 296-155-305, Signaling and Flaggers.

Hazardous Materials Usage and Hazardous Waste Generation

Hazardous materials usage would primarily be an issue after construction is complete. Research should be conducted to ensure the proposed plant site has never been developed or used for hazardous waste or contaminated media disposal activities.

3.15.2.2 Operation and Maintenance

Cogeneration Plant Site

Natural gas for fueling the cogeneration plant would be supplied via the existing BP-owned pipeline running from Sumas to the refinery and by one of the two nearby third-party pipelines. Pipeline pressures in the BP-owned pipeline would not need to be increased beyond currently approved operating limits to supply sufficient natural gas to the three combustion turbines used to drive the electric generators. Steam and hot exhaust would also be generated by the cogeneration plant. Steam would be recovered at two pressures (intermediate, about

600 pounds per square inch [psi], and high pressure, up to 1,800 psi) and used in BP's adjacent refinery. Excess steam would be used to generate electricity via a steam turbine.

Electricity generated by the power plant would be transmitted by two new 230-kV transmission lines to the BPA power grid via an existing BPA 230-kV transmission line. The electrical interconnections would occur approximately 1 mile east of the BP cogeneration site. The alignment and size of the proposed new transmission lines between the plant and electrical interconnection is unknown.

Hazardous substances associated with operation of the plant include emergency fuels and anhydrous ammonia for emission controls. Emergency fuel would only be used when the supply of natural gas is not available and likely would be a low sulfur distillate from the refinery's diesel de-sulfurization unit. Additional fuel would not be stored onsite. A large tank of anhydrous ammonia may be stored onsite for use in a selective catalytic reduction emission treatment system.

In addition, oily wastewater in small quantities would likely be generated from drips around valves. Wastewater would be contained locally with catchment pans or other devices to prevent them from entering stormwater runoff streams.

Protection of Employees

Protection of employees is largely governed by WISHA health and safety regulatory requirements under WAC Chapter 296.

During the public meetings, no specific questions regarding health and safety were asked. Topics related to health and safety were discussed, however, and included questions pertaining to emergency fuel storage, whether ammonia would be used by the plant, and whether there would be traffic impacts. Additional issues to consider include process safety and working with high pressure steam lines.

Pipeline Safety

The WUTC is responsible for enforcement of pipeline safety rules pertaining to construction, maintenance, and operation of pipelines that transport natural gas in the state of Washington. Some, but not all, of the WUTC's regulatory provisions that may be applicable to this project include the following:

WAC 480-93-020 Proximity Considerations, and WAC 480-93-020 Proscribed Areas. Gas facilities having a maximum operating pressure greater than 500 psi or 250 psi are restricted within certain distances of sensitive areas such as playgrounds and schools.

WAC 480-93-180 Plan of operations and maintenance procedures; emergency policy; reporting requirements. Operating and emergency plans are required for gas pipelines.

The WUTC has expressed concern that BP provide sufficient detail to establish the operating pressure and maximum allowable operating pressure for the BP-owned natural gas line serving the refinery. The WUTC also requested that the project proponent confirm the establishment of the maximum allowable operating pressure for this pipeline.

The WUTC also expressed concerns regarding potential operation of the pipeline above the current maximum operating pressure of 550 psi. If the pipeline is operated above the

maximum operating pressure, proximity considerations must be addressed and the line should be required to follow uprating procedures specified in 49 CFR 192, Subpart K and/or file for approval to operate as required by WAC 480-93-020. The WUTC also requested that BP describe the route the existing gas line follows and any considerations of an increase in the maximum allowable operating pressure of this pipeline and how the increased pressure could affect people, buildings, and property along the route. High-consequence areas must also be identified and procedures identified to ensure pipeline integrity in these areas and areas of new development (Washburn 2001).

In addition, the public may generally lack confidence in the safety of operating pipelines. Means should be taken to assure the public that any potentially increased pressure within the BP-owned pipeline; ongoing operation and testing of the pipeline; and siting, construction, and testing of new pipeline connections would be thoroughly investigated and analyzed to provide the greatest degree of safety and prevention of catastrophic events.

As noted above in Section 3.15.2.1 on pipeline safety during construction, issues of the potential for accelerated corrosion of the pipeline in the presence of strong electrical fields from the generation plant need to be carefully considered. Also, odorization of the natural gas fuel used by the generation plant after receiving from the main distribution pipeline is advised.

Catastrophic Events

WISHA regulations under WAC 296 also apply to the prevention of explosions or other dangerous releases of highly hazardous chemicals. Since ammonia would be used at the facility, these regulations could apply, specifically, WAC 296-67-001 Process Safety Management of Highly Hazardous Chemicals. Also if any storage of fuel products is envisioned, the regulations under WAC 173-180D-010 Facility Oil Spill Prevention Plan Standards could apply. In addition, the refineries Spill Prevention Control and Countermeasure Plan would need to be modified to include oil handling facilities at the cogeneration plant.

Traffic

No significant post-construction health and safety issues related to traffic were raised by the agencies or the public.

Hazardous Materials Usage and Hazardous Waste Generation

Ecology administers a number of regulations governing hazardous material usage and disposal. Specific regulations, which could be applicable to this project, include WAC 173-303 Dangerous Waste Regulations.

Ecology, Whatcom County Health Department, and public concerns regarding hazardous material usage are centered around the use and storage of ammonia at the plant site. Additional hazardous substance could include low sulfur distillate from the refinery's diesel desulfurization unit for use as an emergency fuel and solvents for cleaning. Concerns to be addressed include spill prevention and prevention of fires or explosions. Concern regarding hazardous waste generation is minimal. Ecology stated that the cogeneration plant could potentially be added to the pollution prevention plan already developed for the refinery.

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